

**MEDICAL TREATMENT IN GENERAL PRACTICE
WITH RECENT ADVANCES**

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WITH A FOREWORD

BY

Bt.-Col. R. N. CHOPRA, C.I.E., M.D., Sc. D. (CALCUTTA) ETC

BY

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TO
THE REVERED MEMORY
OF
MY PARENTS

FOREWORD

BY

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The greater part of the space in books on medicine is generally devoted to the description of the aetiology, diagnosis and symptomatology of a disease and the treatment is only perfunctorily dealt with. A complete modern treatise on treatment, keeping in view the conditions existing in India, is yet to be written. The general practitioner has, therefore, always felt the want of a book dealing adequately with treatment, and this book is intended to supply the want. Dr Dhar has given a short, summarised, yet adequate and above all an up-to-date account of the treatment of different diseases as met with in India while keeping in mind the conditions under which the medical practitioners have to work. It makes good reading and the references given in foot-notes are a welcome feature as these are likely to stimulate the reader to consult the books and journals referred to. The symptoms and differential diagnosis of various diseases are lightly dealt with and the treatment is discussed in detail under appropriate headings so as to make the facts easily accessible. The recent advances in therapeutics are admirably brought out and a large number of prescriptions have been given which greatly enhance the value of the book. The European and American text-books which are greatly used in this country

make no mention of the Indian dietary, and the physician in India is left without any guidance as to the local substitutes. The inclusion of Indian preparations in the description of the diet given by this author should greatly appeal to medical practitioners, particularly in Bengal. The author does not pretend to lay stress on tropical diseases but the treatment of various maladies so called tropical has been adequately described.

Such successful results could not have been achieved by compilation alone, for to record so concisely and lucidly the essential facts requires personal knowledge of the various aspects of therapeutics as practised in this country. There is no doubt that the wide personal experience of the author as a practising physician combined with his experience as a teacher, has enabled him to complete his task successfully.

I wish to congratulate Dr Dhar on his achievement and trust that this volume, in the writing of which he spent many long years, will meet with success it deserves.

School of Tropical Medicine
Calcutta
February 1939

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R N CHOPRA

PREFACE

The present volume is an outcome of the experience in medical teaching for a period of over ten years which has given me the impression that it is not always possible to devote while teaching such time care and attention that treatment of diseases demand. Medicine is such a vastly growing subject that it is not possible for the general practitioner and the senior student to keep pace with its recent advances so every attempt has been made to incorporate in this book, the recent developments in therapy. As it is not customary to include clinical features in a book on treatment an insignificant space has been devoted for this purpose stressing on the clinical aspect with a view to help the diagnostic task of the practitioners away from the laboratory aids.

This work does not claim for itself to be a complete treatise on treatment and though primarily intended to meet the difficulties in tropical practice yet the diseases common in temperate climates but met with in tropical general practice have not been neglected.

The number of drugs used in treatment are daily on the increase, and are growing to a legion, here to choose effective ones is rather difficult. In order to guide the young practitioner, adequate number of fitting prescriptions have been included in the text.

Selection of Indian diet is often puzzling to the young doctor, so, as far as possible a complete list of Indian dietary has also been given.

The arrangement of the chapters may not appear well planned but the first portion deals with acute infectious processes of most of the systems then follow the commoner diseases system by system.

In getting the book ready I have got help from numerous sources, most of them are gratefully acknowledged at the foot notes.

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MEDICAL TREATMENT IN GENERAL PRACTICE WITH RECENT ADVANCES.

CHAPTER I

INTRODUCTION.

The human system, resulting from an evolutionary process of millions of years, is endowed with the most amazing power of adaptability to circumstances, adverse or otherwise. The perfect machine supplies faithfully the optimum quota of blood to the different organs under varying conditions of stress and strain. The kidneys filter with greater accuracy a huge lot of surprisingly complex fluid, during the whole span of life of an individual, than the best filter-bed, ever conceived, is capable of doing. Brain the master mechanist, the subtle biochemical regulating hormones, the finished defensive juices, the fighting white blood corpuscles, act as ever-watchful alert soldiers, all for the upkeep and protection of the system.

Such a perfectly organised mechanism to fall victim to diseased processes, should mean much more than we apparently see, or can search out. Little burdens, may be in the form of some chronic focal sepsis, defective nutrition, bad air or water supply, unhygienic living, even a psychic trauma, while acting singly might not have probably been sufficient to produce disease, when had their accumulated collective injurious effects, would give rise to some disorder, to be called a disease, when serious.

Hence in our plan of treatment not only these little loads should be unburdened, but also no stone should be left unturned, to raise the threshold of resistance of the patient, through medicines, fresh air and water, light, sun, physical and even psychical measures, and also by a judicious care and regulation of his habits, dietetic regime etc. Because it is the raised body resistance of the patient, on which, we have to depend ultimately for a cure.

Little burdens
should be un-
loaded and the
resistance built
up by all means
at our command

Specially in acute diseases we are apt to forget the importance of the person as a whole 'There is no separation of man from his disease or of disease from man. It is the patient

**Think of the patient as a whole Important
ee of individu
alsing** disease or of disease from man. It is the patient and not the typhoid bacillus that presents to us the disease typhoid fever' Here too, we should consider "the patient as an individual reacting to

myriad of conditions of which the disease itself is but a part'² One should also profitably bear in mind that, as no two faces are exactly alike so also are never two human systems similar Even brothers and sisters of the same parentage brought up under identical conditions may have very dissimilar constitutions Hence there cannot be "never or nothing in medicine To administer to the need and satisfaction of the individual is a great art It is a science in so far as the application of the principles of this complex medical knowledge, in that particular case is concerned

Before starting actual treatment it is better to have a plan, based on the diagnosis and indications, and with a mind to eradicate

**Better have a written plan and details of treat
ment** the disease wherever possible instead of treating symptomatically One should know the limits of therapeutics and predict of likely outcome of treatment gained on experience only, because

to expect to accomplish an apparent impossibility is to court failure and thus lose the confidence of the patient and his relatives or guardians This well planned line of treatment should not be altered unless there are serious reasons and should be given trial for a reasonably sufficient length of time, to produce some structural change in order to gain any favourable functional manifestations Impatience on the part of the patient or his relations may be adequately met by tactfully explaining the situation to a reasonable guardian or relation The instructions are better written down in a small exercise book or paper, and the persons concerned made to understand what each one, including the patient, is expected to do This not only gives them something to go by but also reminds the busy doctor during subsequent visits of all about that particular case

Simplicity, practicability and above all cheapness are important considerations in treatment, particularly for rural and general practice

Simple cheap but efficient treatment should be aimed at It is essential that cheap and effective remedies are chosen, so that the patient is given the benefit of maximum of effectiveness with the minimum of cost The indiscriminate use of patent drugs notably with secret formulæ be better avoided

² Longcope (1932) Bull John Hopkins Hosp 50 4 Jan, 1932

³ Bailey and Weiskotten (1937) Jour Amer Med Assoc 109 26 p 2136 Dec 25th 1937

The types of treatment will be *radical*—when it tries to remove the very cause of the disease. Though this is only possible at the earlier stages when definite structural alterations

Types of treatment. are not likely. Understanding of the exact pathogenesis of diseases is essential for successful radical treatment. To relieve the pain of lumbago, the fibromyositis of the back muscles, by analgesics while the pyorrhœa alveolaris the root cause, is left untouched, is one of the examples of *symptomatic* and often futile treatment. But when symptoms are troublesome or exhausting, such as an irritating cough or a tiring pain or colic, they must be relieved along with radical treatment otherwise they will make the patient weak through sleeplessness and lack of rest. But to stop motions of acute bacillary dysentery by opiates, or a cough helping expectoration, may cause trouble, if not disaster. Hence one should know when to interfere and when not to do so. This knowledge of discrimination between salutary and injurious symptoms is essential for proper treatment.

Expectant Treatment involves a policy of non-interference and inactivity guided by the careful supervision and scrutinizing watchful eye of a physician. The therapeutic agents may act *rationally* or *empirically*. Insulin in diabetes mellitus, thyroid extract in myxoedema or cretinism, are examples of the former, whereas emetine in amoebic dysentery sodium salicylate in rheumatic fever are examples of the latter type of therapy.

The Plan of treatment generally includes —

- (1) *General Management*—Conservation of the strength of the patient which includes details like, good nursing, suitable dietary ventilation rest, sleep and so on, should be aimed at
- (2) *Medicinal Treatment*—Here some overdo, while others do too little, the former group pin their whole faith on drug therapy, while others take them as mere placebo. But the via media, is the reasonable course. Mixing up of several active constituents in a mixture elegantly and effectively requires an experience and care, which no doctor can afford to neglect. Medicines when properly and timely given in adequate dosage can do a great deal.
- (3) *Dietetic Management*—On suitable scientific dietary depend the optimum health and activity of the body tissues and cells and in the human system constitute the major factors of resistance, on which we have got to depend for the cure of diseases. This important branch of medical science namely, dietetics is not only important for metabolic and intestinal

troubles but in every sphere of treatment it is of signal value. Here the tastes likes habits environment and at times even prejudices of the individual should be taken into serious consideration. If the person craves for any particular item of food unless obviously injurious the safe plan would be to allow a very small fraction of it on the first day and watch its effects if nothing injurious or untoward follows then one could increase the amount gradually and cautiously keeping watch over the likely evil effects of such a diet. In practice much may actually be accomplished by carefully charting out the dict of the patient. Though unfortunately to this neglected but very important item in treatment we are not sufficiently mindful.

- (4) *In physical therapy* — baths medicated or simple hot or cold fomentations poultices counter irritants liniments exercise passive or active massage movements electric thermic various rays and lights are in use. The electrical treatment is not always possible to be administered in many places due to want of scope and means. But the other simple but very useful ones even are not always taken advantage of though they may help materially in the relief and even cure of illness.
- (5) *Psychotherapy* — The mind in a physically ill body is as a rule very sensitive and naturally craves sympathy and kind ness. So a kindly smile and a few words of sympathy may help in producing a permanent good impression about the doctor to the latter's credit and advantage. To this the students and young doctors cannot afford to be unmindful. The mind influences the body profoundly so the doctor should not think only in terms of tissues and structures excluding the mind out of the field. Our holy waters charms and talismans which sometimes exert no insignificant influence on the body through the mind are simple reliques of psychotherapy which in its modern aspect consists of suggestion persuasion hypnotism psycho analysis and such others. Auto suggestion may serve both as means of getting rid of or getting entangled into diseases.
- (6) *Prophylaxis* — A large part of our practice is usually amongst persons suffering from communicable diseases. If proper care is taken to check the spread of these preventable diseases, many of the valuable lives lost may be saved. The burden of educating the public to civic and sanitary sense should in this land where public health departments are at their infancy, have got to be shared by us the practising physicians.

(7) *Surgical aid*—The surgeon's help should always be sought for in all cases of doubt and not uncommonly the physician will be materially benefitted by his valued suggestions.

Lastly, one should remember the limitations in therapeutics—and when the patient is beyond all human help, his last days or hours of

Promote suffering may have to be made painless and bearable, and thus promote euthanasia by suitable analgesics, hypnotics, and others. In the words of a great worker⁴—"In these circumstances instead of still trying to stimulate the flagging vital powers by such agents as strichnine, alcohol and oxygen one should use morphine and, use it freely."

CHAPTER II

INFECTION.

When micro organisms gain entrance into the body, multiply, and cause deviation from normal states or bring about frank abnormality in the system, it is called disease

The newly born human baby's body, orifices and passages are sterile at birth,¹ but in a few hours the skin and the exposed mucous surfaces, become the seat of numerous bacteria, a condition more or less persisting for the rest of its life

Sources of Infection—Besides the human beings some lower animals may be sources of a few infections—such as plague from rats, Malta fever from goats, and so on

Modes of spread—May be direct or indirect

Direct method—Infected person,—contalescent, cured, or contact carriers, through their own or relations' ignorance or carelessness may help in the spread of diseases. The bacteria gain entrance through the various cavities and orifices, and according to their natural selection, habits, resistance etc., either succeed or fail in producing disease. Most of the diseases of the naso respiratory tract, are caused by direct droplet infection. The modern places of amusement, where all sorts of carriers of respiratory disease gather in closed halls, help all the more, in their spread. Open air life is very useful for the prevention and cure of respiratory infections

Indirectly—Many diseases occur through food, finger, flies, filth, fomites and fluid. The pernicious habit of throwing bodies dead of cholera into rivers, has not uncommonly, helped in the spread of this easily preventable disease. There are numerous bad habits and customs which also are prolific sources of the spread of many infections

Certain insects, such as mosquitoes, sandflies, fleas, ticks, and others, act as *intermediary hosts (vector)* in the transmission of certain diseases

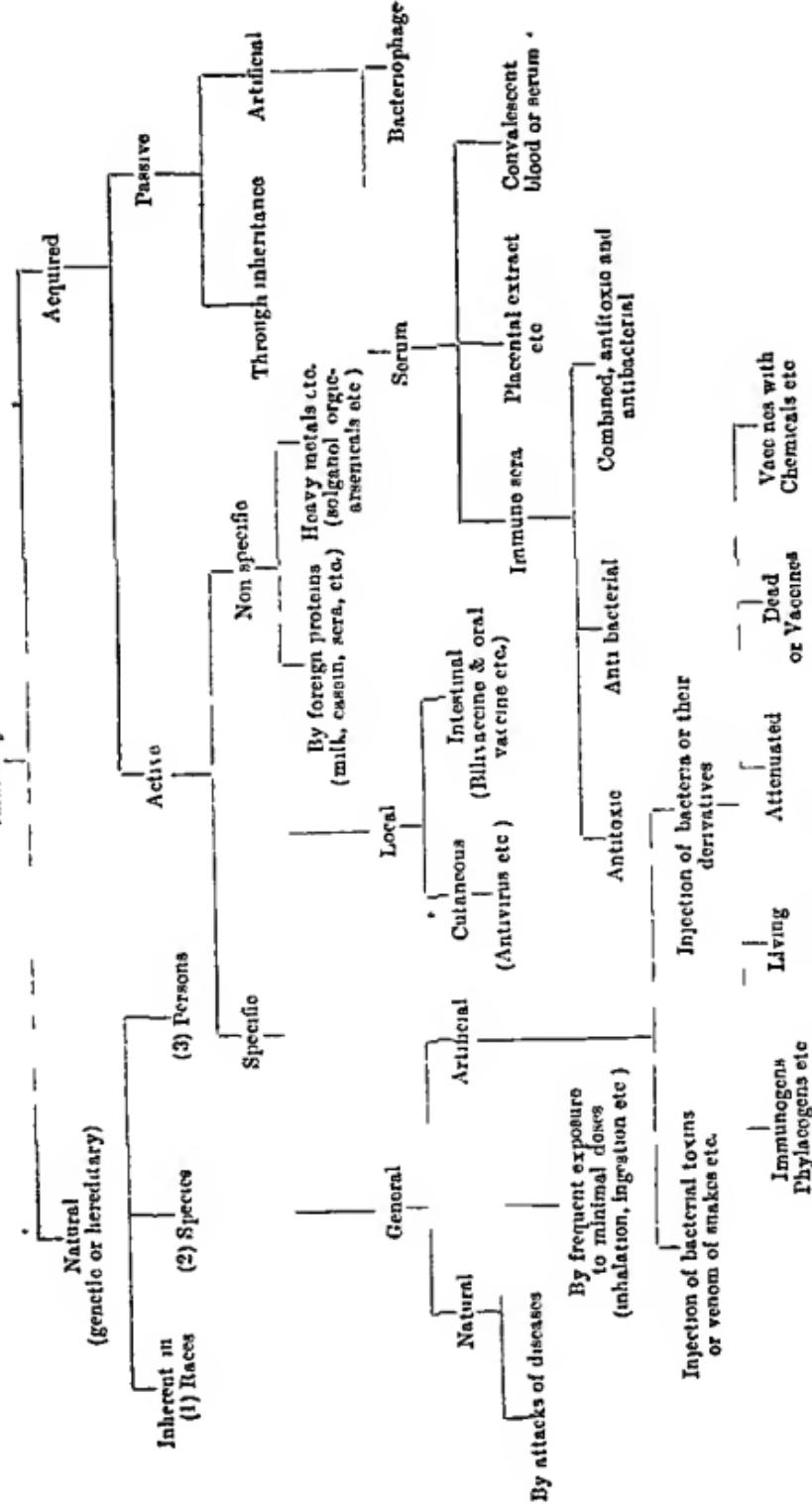
The path of entrance of bacteria into the system is of considerable importance in determining their effects on the host, as for example virulent pneumococci when swallowed, may not produce any disease, whereas if they enter and get a foot hold in the respiratory passages—may cause even fatal pneumonia. Any lowering of resistance, local or

CHAPTER III

IMMUNITY

In short, nonsusceptibility to disease is immunity

Immunity I



¹ Modified from Dr. Chatterjee (1935) Bacteriology

CHAPTER III

IMMUNITY

(including practical points on nonspecific, vaccine and serum therapy)

A little thought to the classification on the previous page will show that immunity is mainly acquired. Example of immunity in species, is seen in the non susceptibility of certain lower animals to some common human intestinal bacteria.

There may be various factors in the production of racial immunity. The comparative resistance of the Jews and greater susceptibility of the Nepalese to tuberculous infection are good examples. Personal immunity lies, not only in the integrity of the skin, mucous membranes, but also on the optimum activity of the various defensive cells and juices, biochemical hormones and normal secretions etc. As example one may mention of the antiseptic action of the normal acid urine and of the gastric acidity.

General Immunity—In childhood we are particularly prone to suffer from several diseases of which measles, whooping cough, diphtheria tonsillitis, summer diarrhoea and so on are common. Most of us reach the adult age having suffered from all these and other infections which may appear in such mild or abortive forms, that though a clear diagnosis could not be made, yet they confer immunity, all the same. This may be said of poliomyelitis, mumps, and such other conditions. But there are some diseases like pneumonia, erysipelas and so on, which make the patient prone to repeated attacks.

Repeated exposure to small doses of bacteria confer some immunity as in the hospital workers sweepers, doctors, nurses and others. The injection of vaccines or inoculation of virus confers protection too, as by vaccination against small pox, prophylactic inoculation against plague, cholera, typhoid and so on.

Local Immunity—Besredka was one of those who advocated local immunity. His idea was to immunise the vulnerable cells of a particular tissue, through proper contact with the antigen, as for example bilivaccines and oral vaccines. The former are used for prophylactic, the latter for curative as well as prophylactic purposes. Local use of antivirus is another example of an effort to produce local immunity.

Acquired Immunity—There are numerous agents which act non specifically in the production of immunity. They probably work when

injected by (1) stimulation of the reticulo endothelial tissues, (2) activation of the cells and juices, (3) improving the detoxicating function of the liver, (4) fixing the hitherto circulating unfixed antibodies at the site of disease.

These substances producing non specific stimulating action may be, *foreign proteins*—like protein of milk, casein, peptone, serum proteins, vaccines, chemicals with vaccines, bacterial, protozoal, or leukocytic derivatives, nucleinates, cinnamates, and so on. They may be *heavy metals*, like, manganese, silver, gold etc., or like iodine—*certain oils with tissue irritant properties* like turpentine, camphor, creosote in olive oil, and many others. Strictly speaking metals and their salts, do not come in this category, but they do stimulate the system to form better defence, hence they are included here.

Some of the commoner conditions suitable for non specific therapy are—

- (1) Cases of prolonged mild or moderate pyrexia of unknown origin
- (2) Chronic inflammatory states like chronic arthritis, fibromyositis, neuritis, and such others
- (3) Chronic inflammations of the pelvic organs in females, in gynaecological practice
- (4) Diseases of the skin
- (5) Such diseases like filariasis, chronic resistant inflammations and so on

These non specific agents are administered by injection, for the skin and mucous lesions, better intradermally or sub-cutaneously, for other purposes intramuscularly. To get very high reaction some of the bacterial products may have to be given per vein, in one to five million or lesser doses.

General palsy of insane, a form of parenchymatous syphilis of the brain, is very well treated by the induction of paroxysms of malarial fever in the patient. Resistant somatic syphilis not uncommonly, responds to fever produced artificially.

Recently pyrotherapy—is being used to cure syphilis² and gonorrhœa with encouraging results.

Commoner contra indications to non specific therapy are—

Allergic states, asthenia and too low blood pressure, any cardiovascular disease, all types of tuberculous infection, diabetes mellitus, pregnancy, and so on.

VACCINE THERAPY —

Vaccines are generally normal saline suspensions of bacteria killed by slow heat, containing either 0.5 per cent carbolic acid, or tricresol or formalin.

Uses —

They may be used for curative, prophylactic and rarely provocative purposes. For prophylactic purposes—typhoid, para A and B, cholera, dysentery, plague vaccines are commonly used. Provocative use is mainly in chronic or latent gonorrhœa. Most vaccines may, more or less, be used for curative purposes.

TYPES OF VACCINES —

(1) *Autogenous Vaccine* — These aim at specific immunity, though there is also a non-specific element in it. To be effective, the culture media should be ideal, and isolation of bacteria, preparation dosage etc of the vaccine, proper and accurate.

(2) *Stock Vaccines* — They contain only homologous bacteria from different sources, and are not so effective curative agents as autogenous ones. They are used extensively—but with variable results. Among numerous other types of antigens sold in the market under various names some important ones are—*sero-vaccines or sensitized vaccines, detoxicated vaccines, phylacogens, immunogens etc*.

A FEW PRACTICAL POINTS ON VACCINE THERAPY —

How given — As a rule vaccines are given sub cutaneously, except in rare cases where they are injected intra venously to produce a brisk febrile reaction, as in some resistant form of filariasis, syphilis and so on. But they act mostly non specifically in these latter diseases.

Dosage, reaction interval etc — The dosage should be so chosen that in acute cases—no reaction is produced, but in chronic cases, for which the vaccines are mainly used, a mild reaction, local at the site of injection focal—at the place of disease, and a general systemic reaction in the form of mild fever, malaise, aches and pains, leucocytosis etc, should be aimed at. But there are so many individual variations, that vaccine injections should always be started from smaller doses and worked up gradually and cautiously. A brisk reaction may mean either too large a dosage or a very susceptible body, both suggesting a next smaller dose. In acute cases, the interval should be about twenty-four to forty-eight hours, whereas in chronic cases it should be three to five days or more according to reaction, indication and so on. In acute cases, detoxicated or simple homologous vaccine is better, because a single causative organism is likely to be the infecting agent, but later on, with the advent of the secondary organisms in the infected area, mixed or combined vaccines are likely to be more effective.

Dosage according to age, sex etc.—Children under six years usually one-fourth, between six to ten years half, from ten to fifteen years two-third the adult dose may be given. In debilitated, old persons or in thin females the dose should be reduced proportionally.

Other methods of treatment should not be neglected.—

Proper medical, surgical and other proved methods should never be neglected while treating a case by vaccine injections, because vaccine therapy is only an additional weapon in the fight against diseases.

One should see that —

(1) Properly diagnosed, cultured and isolated bacterial vaccine, preferably autogenous—is used

(2) Vaccines older than six months are not likely to be of much use

(3) Hurry on the part of the doctor is bad, so also are too frequent injections of vaccines.

(4) The doctor should not allow vaccines to control him, but just the contrary should hold good

(5) One should defer the injections, when there is any difficulty, however mild, such as menstruation in women, mild infections or contemplated journey and so on

Choice of remedy —Vaccines are useful in sub-acute and chronic conditions whereas in acute states serum is the therapy of choice.

SERA .—

Sera—confer, when injected, immediate and passive immunity to patients Their uses are curative as well as prophylactic.

They may be—

(1) *Antitoxic Sera*—as those against diphtheria, tetanus, gas-gangrene and others They act by neutralising the toxins, circulating and fixed in the tissues

(2) *Antibacterial Sera*—obtained by immunisation with actual bacteria They are supposed to act against the bacteria, as for example, anticolon serum, etc.

(3) *Both antitoxic and anti-bacterial sera*—for example —polyvalent anti-streptococcus sera of various types (erysipelas, puerperal, etc) anti-staphylococcus, anti-dysentery, anti-meningococcus, anti-cholera serum, etc.

(4) *Convalescent Sera*—are used for curative and prophylactic purposes specially in measles, etc

(5) *Hæmostatic Sera*—are usually tissue extracts like cephalin, sometimes, mixed with horse-serum or other substances

(6) *Placental extract* is useful in measles and hæmophilia.

How given—Sera are generally given intramuscularly, subcutaneously, intravenously or intrathecally. They are given intravenously specially in children, also through punctured cisterna and intraperitoneally in emergent cases. Sera are sometimes given orally too.

SERUM REACTIONS—The reactions after the injection of all sorts of therapeutic sera vary very widely in their severity, time of onset, frequency, etc., depending on the susceptibility of the subject, type and amount of serum injected, whether it is repeated or not, and so on. The reactions are—

1 Serum shock—or spontaneous hypersusceptibility with immediate reaction may prove even fatal. These subjects are usually sensitive individuals intolerant to foreign proteins. They are either the subjects of asthma or belong to the family of asthmatics and show various types of sensitiveness, or have received the injection of horse serum previously, or subjects of status lymphaticus or hay fever or prone to urticarial attacks. So before sera are injected one must ascertain the above details and test the sensitiveness of the individual and when found sensitive by the skin reaction test they should be first desensitized and then serum given. The symptoms of serum shock are respiratory oedema bronchial spasm intense dyspnoea, cyanosis, respiratory failure collapse and others almost immediately or along with the injection. Treatment of this reaction (immediate), however careful, will generally terminate fatally hence the best is to prevent it.

Pre-entice—Desensitize the patient by giving gradually increasing doses beginning from one drop of serum diluted one in ten of sterile normal saline at quarter hourly intervals, till the patient shows no reaction even after the injection of one c cm of the diluted serum. Then gradually the undiluted serum should be injected beginning from one tenth of a c cm and the reaction watched. If nothing untoward follows then it may be given in increasing doses.

Either injection of atropine with adrenalin and calcium gluconate or the oral administration of calcium and ephedrine with tincture belladonna allowing enough time for their action to take place, when precedes the administration of serum this hypersensitivity is much less or diminished materially.

N.B.—Before giving all sera specially when given intra muscularly or intrathecally the sensitiveness of the patient should always be tested.

Curative treatment—of this very serious and even fatal condition lies, in the prompt injection of 1 to 1 c cm of adrenalin with atropine sulphate 1/100 to 1/200 gr and should be followed by the injections of calcium gluconate.

(II) *Serum sickness*—This generally manifests itself on an average of six to ten days following the first dose of injection of serum. This is a reaction to foreign protein hence the greater the amount of horse serum injected the more marked the reaction is likely to be. In the concentrated sera the amount of foreign protein being very little through elimination in the process of concentration this reaction is generally very mild too.

The symptoms of serum sickness are swelling of the lymph glands and moderate leukocytosis followed by leukopenia skin rashes of various types usually urticarial or erythematous with itching, local oedema, fever malaise gastro intestinal disturbances headache pain and swelling in the joints conjunctivitis and so on. Retention of water and chlorides without albuminuria delayed coagulation of blood and others are also sometimes encountered.

Various types of paralysis of the nerves are also met with.

The condition usually lasts for about one to four days and may rarely extend up to weeks.

TREATMENT OF SERUM SICKNESS MAY BE PREVENTIVE AND CURATIVE

Preventive—If a mixture containing proper doses of calcium lactate, tincture ephedra vulgaris tincture belladonna with potassium citrate and bromide as discussed in chapter on allergy is given thrice daily after food a day or two preceding the expected time of onset of serum sickness thus allowing their full action to take effect during the expected time of serum sickness and continued till it passes off, the symptoms are either aborted or slight or moderate, even in cases where big doses of horse serum have been given as in the treatment of meningitis and so on.

Curative—Once the symptoms have begun injections of adrephrine, calcium gluconate and atropine in proper doses tend to ameliorate the symptoms. For the itching one per cent carbolic acid solution in lotio calamine, as a local application, is useful. But the preventive treatment, as indicated above, should preferably be followed in all cases and thus this condition made impossible to develop.

REACTION TO RELATED INJECTIONS—I or administering serum to a person, who is not sensitive, or has a non asthmatic family history, or has not received sera previously, the injection should be repeated daily or on alternate day or even every third or fourth or even fifth or sixth day. Here no untoward results are likely to follow. But after the first injection, if sufficient time passes so that manifestations of serum sickness are allowed to develop, then only the second injection, given in the system render it sensitive, as indicated by serum sickness, will cause acute serum shock described under the first heading of spontaneous hypersensitivity. There is no fixed rule as to the

CHAPTER IV

MALARIA

Diagnosis in short.—

In benign tertian and quartan malaria—the clinical signs and symptoms differ from those of malignant tertian infection. Residence in an endemic zone of malaria, history of previous attacks, and in benign tertian and quartan infection the characteristic history of the primary fever, coming generally in the forenoon, usually with three clear-cut stages—namely cold, hot and sweating, the duration of fever about eight to twelve hours the periodicity of fever, coming every forty-eight hours in benign tertian and seventy-two hours in quartan malaria, are suggestive. Such signs and symptoms like, vomiting, headache, jaundice, coated tongue, constipation, anorexia, enlarged spleen, and the liver in acute stage anemia and others are important aids in diagnosis.

Malignant Tertian Malaria.—Unlike the other two types already mentioned the onset may be at any time of the day or night, usually without any or much chill or rigor. The headache, vomiting, burning sensation of the body and often other severe subjective symptoms quite out of proportion to the degree of fever may be very helpful clinical points in diagnosis of this, rather serious type of malaria. The duration of fever is longer and may extend in the majority even upto two three days. There may sometimes be noted quotidian or remittent periodicity hence the importance of remembering these three types of temperature caused by this serious infection. The three characteristic clear cut stages so typical of the other two infections, may partly or completely be lacking in this. In severe but atypical forms of malignant tertian infection termed pernicious or subtertian malaria, besides the above groups of clinical symptomatology an emaciated, icteroid tinge of the conjunctive, and a palpable spleen may be helpful in diagnosis.

Finding of parasites and Therapeutic test.—

But one cannot stress too strongly on the importance of finding the parasites in the blood under the microscope the eye of the doctor. No doctor practising in the tropics can do without this valuable instrument. In bad cases repeated, even six hourly examination of the blood film may save the life of the patient. But it should also be made clear that when clinically diagnosed, negative finding of the parasites does not necessarily prevent the doctor from trying therapeutic tests. Because a person like Osler said,¹ "Any fever which resists the action of quinine properly administered for more than four or five days is not malarial in character". The parasites though may not be encountered in the peripheral circulation where even small doses of quinine have been exhibited. Recently plasmodium ovale is being described again².

So the diagnosis depends mainly on.—

(1) Clinical findings (2) parasites in the blood (3) pigmented leukocytes—especially the large mononuclears when increased above thirteen per cent or more (4) response to proper doses of quinine, administered suitably, but here

1. Osler's Modern Medicine—Vol II, Malarial fevers, Craig (1925)—p 333.
Lea and Febiger's publication Philadelphia and N.Y.

2. Manson-Bahr and Muggleton (1937) Brit. Med. Jour. I p. 217.

the possibility of fevers of short duration should naturally have to be excluded. Cultivation of the malarial parasites by Bass and John's method³ is not as a rule practicable, except in well equipped laboratories.

Differentiation has got to be made from all other fevers of short duration—like influenza, dengue, also, all progenic infections, tuberculosis, amebic hepatitis, etc.

TREATMENT

Prophylaxis —^{4,5} The measures are (1) draining of breeding places (2) clearing out of bushes, small plants, jungles and so on, acting as shelters of the mosquitoes, (3) oiling of pools and puddles, (4) use of larvicides like—sulphurous acid, potassium permanganate acted upon by hydrochloric acid, sulphate of iron and copper, formalin, aniline, kerosene or fuel oils, (5) regular service of mosquito brigade—for the destruction of shelters and breeding places, by a group of specially trained men, (6) breeding of larvicide fishes, (7) destruction of mosquitoes, by gas or fumes, (8) screening of houses, so that mosquitoes can not reach and bite the infected persons, (9) isolation of the carriers beyond the reach of these insects, (10) use of plasmoquine to sterilise the patients, and asymptomatic carriers' blood of the gametocytes, (11) educating the public to the danger of the presence of the carriers, (12) to try to sterilise the blood of the mass in an endemic locality, combined with measures against the mosquitoes.

PERSONAL PROPHYLAXIS —

This consists mainly in protecting oneself from being bitten by mosquitoes.

(1) Travelling when malaria is least prevalent, preferably during the day time than at night (2) Houses and camps should be away from any stagnant collection of water (3) Sleeping under mosquito-curtain and on the first floor or higher up (4) Fans or *fankhas* tend to keep the mosquitoes away (5) Use of preventive drugs like atabrin and plasmoquine.

CURATIVE TREATMENT —

There is hardly any subject in medicine, on which there is so much difference of opinion, as to the best method of treatment, as there is in that of malaria. So one has tried in the following pages to give some standard idea given vent to by several experienced workers, naturally modified according to one's own little experience.

³ Bass and John's (1911 and 1914) Jour Amer Med Assoc (1911) 57 p 1534
and also, Amer Jour Trop Dis and prevent Med (1914) No 516

⁴ Satyanarayana (1934) Rec Mal Survey of India 4 Dec p 313

⁵ Sinton and Majeed (1933) Ibid 5 March 3

GENERAL MEASURES —

The patient should be put to bed, notably in all acute cases, as it enables the doctor to watch the effects of treatment and the patient gains by conserving his own strength.

Give quinine immediately in bad cases — If the case appears to be severe, or the subject a newcomer in the endemic area, no time should be lost for the preliminary purgation and alkaline treatment, and quinine given by the most quickly effective route.

In average cases — Average benign tertian and quartan infections are not, generally so severe, and the patient if seen during the acute febrile stage may be treated in the following plan:

(a) Relieve some of the distressing symptoms and try to unburden the pigmentary overload of the liver and cause evacuation of the bowels, because for quick absorption and assimilation of quinine, the specific drug, these are important pre requisites, where possible.

HEADACHE AND BURNING SENSATION DURING THE HEIGHT OF FEVER —

This is due partly to sudden liberation of such a lot of foreign protein and other substances, and may, to some extent, be relieved by a powder like the following, which also helps the evacuation of bowels.

Hydrarg subchloride	gr	1/4
Phenacetin	gr	1
Aspirin	gr	1
Caffein citrate	gr	1/6
Sodium bicarbonate	ad gr	6

one powder every half an hour to an hour, till two to six are taken according to the state of illness severity of symptoms and so on.

VOOMITING ETC

Along with the above powder, glucose drink, or where it is not available—sugar or sugar candy water, with lemon juice, (the latter helps in alkalinising the system) and salt added according to taste, may help in reducing the burning sensation and vomiting. It appears that as soon as the liver starts storing glycogen, most of these distressing symptoms of the patient begin to disappear. The vomiting in malaria is usually bilious and may be only an effort to get rid of the extra bile formed through the destruction of numerous red blood corpuscles, liberating such a lot of pigment and hemoglobin. Vomiting is generally a temporary,—but sometimes distressing symptom, except in the bilious remittent manifestation of malaria, where it persists for some days even.

During fever a suitable alkaline mixture, plenty of glucose or sugar, which helps storage of glycogen in the liver, freely acting

bowels, are generally sufficient to relieve most of the distressing symptoms of the patient

The following is an example of an average alkaline mixture

Potassium acetatis	gr 30
Potassium citratis	gr 15
Liquor ammoni acetatis	m 60
Spirit etheris nitrosi	m 10
Syrup aurenti	fl dr 1
Aqua cinnamomi	ad fl oz 1

one dose every three to four hourly during fever, and also an hour before taking the dose of quinine during the afebrile period. Because quinine appears, at least, clinically, to be more effective, when combined with alkaline treatment, purgatives and preceded by calomel than when used alone Craig (1925)⁶ also subscribes to this clinical experience 'It is well to secure a complete evacuation of the bowels with or before the administration of quinine. The administration of calomel until bowels move freely renders the action of quinine much more efficient. It hastens and favours the absorption of the drug.' Calomel in divided doses of $\frac{1}{2}$ to $\frac{1}{4}$ gr repeated every half an hour or one hourly till a total of one to two grains are given, is quite suitable for this purpose. It should be followed by saline purgatives.

DIET, FLUID ETC—During the acute febrile stage, liquids should be given, as much as the patient can take. Cold water, barley water either with lemon juice and salt or barley water and soda water or milk and soda water, glucose water, green cocoanut water where available sugar or sugar candy water with lime juice, are sooth ing. These liquids help in getting rid of the injurious agents and promote diuresis. Lemon juice, juice of shaddock (Batapi) act in the same way as other alkalies because citric acid is absorbed as an alkali. When the fever is gone and the patient feels better, milk and sago due to the latter's laxative qualities, or bread and milk, or decoction of lentils, butter milk, ice cream, baked custard etc., may be allowed. Solids are better avoided till the patient remains fully afebrile for two days, because not uncommonly one notices that overloading the stomach with rice and curry, specially if associated with constipation, helps in bringing about a relapse. Dry diet, like chapati and curries somehow, is not so unsuitable as rice. The latter should at the early afebrile period be better granted only during the noon meal. It is desirable that the patient should not overload the stomach.

CONSTIPATION—In all forms of malarial fever, there is a tendency towards constipation, and when not properly relieved, tends to cause

relapse. Hence during the whole course of treatment this should be carefully avoided. Probably, freely moving bowels absorb and assimilate quinine better than when the person is constipated, and thus the relapse is prevented.

QUININE AND OTHER SPECIFICS—ETC.—

Some recent ideas⁷—We have got much new light on treatment from the recent report on malaria, by the Commission of League of Nations⁸. This is a mine of information and those who are interested may read it with profit. Some of the very important items are summarized below.

- 1 Quinine has got no appreciable effect when given during the period of incubation and little effect during the first few days of fever.
- 2 It is a common error to think that earlier the specific is exhibited the better is its curative effect but the truth is more or less in the reverse, except in those cases, where the body is overwhelmed by a severe parasitic invasion. As has been emphasised, that diseases get cured by the development of body defences so also quinine acts better in conjunction with the gradually developing defensive mechanism of the system, evolved out of the fight with the protozoa. These defensive forces gradually better themselves and get an upper hand along with the paroxysms of malaria⁹. So treatment should aim at formation of the power of tolerance (immunity) against the parasites.
- 3 The patient should be in bed and the type of the infecting parasite ascertained.
- 4 Relapses are more amenable to quinine therapy than the primary attack.
- 5 It has been proved that larger doses of quinine are not more effective than moderate doses and that treatment for too long a period may suppress the host's natural defences.
- 6 Hence, according to them curative treatment should not exceed seven days at a time, initially. An interval of seven to ten days in between two courses appears to be effective in preventing relapses.
- 7 Medication for some length of time.
- 8 The acute primary attack, they say, is better treated by quinine alone, and the administration of the recent remedies like plasmoquine or atebrin, is better deferred until the acute stage of the disease has been overcome.
- 9 If one specific is to be used which is the one of choice? The committee states, that, for primary infection by plasmodium falciparum (malignant tertian), atebrin is more effective than quinine or any other drug hitherto known. The usual dose though is 0.1 g or 1.5 gr three daily after food, for five to seven consecutive days yet two tablets, that is, 3 gr three daily after food has been advocated for the first day. They

⁷ James and others (1932) Quarterly Bull. of the health organisation of the League of Nations—2 (2) January 1932

⁸ Hoops (1933) Malayan Med. Jour. Dec. 5 No. 4 p. 212-215

⁹ Ferguson (1933) Rev. de Malariaologia 14 n (suppl to No. 3)

suggest 0.2 g or 3 gr for intravenous use. In bad malignant tertian infection they advocate quinine intravenously followed by oral use of atebrin 9. In benign tertian and quartan malaria there is no unanimity as to the choicest remedy, because some of these parasites, after a few paroxysms, are naturally liable to produce no fever, even without much treatment. 10 Alternate use of atebrin and quinine in succession, is suggested, because they think atebrin to be better than quinine in relapses.

SOME IMPORTANT WORKING DETAILS IN QUININE THERAPY —

Quinine has got numerous salts of which sulphate is the cheapest. For an average Indian patient five to seven grains of sulphate dissolved and as given below, thrice daily appears effective. The big ten to fifteen grain doses are not only unnecessary, but according to expert opinion are actually injurious, as they hamper the formation of defence of the system upon which the ultimate cure of malaria as of all other diseases depend. During the acute stage it is better given, either at the decline of the fever, or just at remission in somewhat like the following form thrice daily alternating with an alkaline mixture, given an hour before each dose of quinine.

Quinine Sulphate	gr 5 to 7
Acid Sulphuric dilute	m 10 to 15
Glycerine	m 15
Aqua menth pip	ad fl oz 1

In bad cases one should not wait for the purgative and the alkalies to act, but give quinine orally or by injection as soon as possible. Otherwise purgatives, alkalies preceded by hydrochloride in divided doses show better results, than quinine given alone.

Those who are susceptible and easily suffer from cinchonism—such as partial deafness, dizziness, ringing in the ears and so on, may try quinine hydrobromide in usual doses, and may take a mixture like the following —

Calcium lactate	gr 10
Sodium bromide	gr 10
Tincture belladonna	m 5
Syrup Zingiberis	m 60
Aqua camphora	ad fl oz 1

one dose an hour before each mark of quinine mixture, notably when sulphate or hydrochloride is used, instead of the hydrobromide.

AVERAGE DOSAGE —

It has been already suggested that an average person requires five to seven grains of quinine thrice daily. Over weight robust persons, more than twelve stones may require even ten grains, whereas under weight males and average females may not require more than five grains.

For persons, of eight to twelve years—three to four grains two to four years two to three grains, under two years—one half to one grain, thrice daily, may have to be given. But it is worth noting that in the case of quinine therapy, the dosage has got to be comparatively large, in comparison with the age and weight of the patient.

PILLS AND TABLETS OR QUININE—These are better avoided in the acute stages as there is the risk of their passing out undissolved, specially this may occur in the case of the sugar coated old tablets. When unavoidable the pills should be inspected by the doctor himself and be satisfied as to their solubility. If these tablets are crushed and taken with lime juice absorption is better. During the acuter stages, specially in more severe attacks where immediate action of quinine is essential for the safety of the patient these tablets and pills should better be avoided. Subsequently when the action of the calomel alkalies and purgatives start and the tongue becomes cleaner and appetite returns and the fever is controlled, these tablets and pills of good solubility may be prescribed.

COURSE OF TREATMENT—Seven days quinine treatment, thrice daily during the febrile period and continued for one to two days after the fever is gone subsequently twice daily after food, may be quite effective. A period of rest for seven days, to be followed by a mixture like the one given below, twice daily after food may be of use. Due to its properties of relieving constipation and for the iron and arsenic content the following prescription may be of service, in all sub acute and chronic cases of malaria.

Quinine Sulphite	gr	5
Acid Sulphuric dilute	m	10
Ferrous Sulphate	gr	2
Magnesium Sulphate	gr	30
Liq Arsenicalis (B P 3 rd)	m	3
Glycerin	m	20
Aqua menthipip	ad fl oz	1

This mixture taken twice daily after food for a week, to be followed by a week's rest, then one dose at bed time, for one week, cures most of the cases. But benign tertian and quartan malarial fevers are rather relapsing in nature and for these relapses atebrin may prove useful. Quinine while given without tonics and purgatives may not be properly assimilated and relapses may occur during the period of rest.

CHRONIC MALARIA—The above prescription, due to its iron, arsenic content and keeping the bowels active, helps to cure chronic cases, by building up the defences of the system, on which the ultimate cure of malaria depends. The recent remedies like atebrin may also

In cases of *cerebral malaria* Umanasky (1931) suggested intravenous injection three to five c cm of a forty per cent solution of *urotropine* to improve the unconsciousness. Though it has no effect on the parasites and the pyrexia

Intramuscular injection of quinine—The concentrated solutions of quinine sold in ampoules in two c cm., are better diluted with sterile saline or distilled water to five to ten c cm and given intramuscularly into the upper and outer quadrant of the buttocks. The suitable place for intramuscular quinine injection is about two to three inches medial to the anterior superior iliac spine, and about the same distance below the iliac crest. Every sterile precaution should be taken, and the part well massaged and fomented, after injection, the absorption of the drug is hastened and hence should always be done. Once the needle is inside the muscles before injecting the fluid, the piston should be withdrawn to ensure that no blood has flowed inside the syringe, indicating that a blood vessel has not been punctured. Intramuscular injections, without this precaution may lead to a fatal issue, and in this particular instance due to sudden entrance of concentrated quinine solution into the circulation.

Intramuscularly it is generally given where, though the symptoms are not very urgent, yet quinine cannot be retained either due to persistent vomiting or diarrhoea, or other causes of failure of absorption, or where the drug is not taken willfully.

Risks of quinine injection—It should be remembered that quinine given orally in the proper way, is very readily and effectively absorbed, hence injections should never be given lightly, not to speak for the sake of injections only. Some workers, go so far as to suggest that quinine injections given without sufficient indication, amounts to malpraxis, because orally given quinine is absorbed quite rapidly and effectively.

The risks of injection may be —

- (1) Persons sensitive to quinine may suffer terribly, and intravenous injections may even kill such patients
- (2) When given per vein, there is much lowering of the blood pressure
- (3) Intravenously given, quinine is rapidly excreted
- (4) Unless the sterile precautions are perfect there is not only risk of sepsis, but even tetanus may follow

Bilious remittent form—The bilious vomiting is generally an effort on the part of nature to relieve the congestion and pigmentary over-burdening of the liver. For this purpose the prescription

containing divided doses of calomel, given with other drugs like the following may prove of use

Calomel	gr	$\frac{1}{8}$
Menthol	gr	$\frac{1}{8}$
Chloretone	gr	1
Sodi Bicarb	ad gr	4

one powder every half to one hour, till four to eight such are given, according to indication. The other measures, to allay vomiting, suggested under the treatment of this symptom in cholera and black water fever, may be consulted. Alkalies and glucose are of special value.

Some workers suggest, that due to the increased bile-content, in these bilious remittent attacks the coagulation of blood is delayed, and intravenous quinine administration may be dangerous, so they suggest intramuscular injections of quinine for these cases. But as soon as possible in these patients as in all other forms of malaria, the specific should be given orally, preceded by calomel, purgatives and alkalies.

Quinine in malaria with pregnancy —About twenty five per cent of the babies born of pregnant malarial mothers die of this infection in the first week. The lay belief that quinine, specially on small therapeutic doses, causes miscarriage is untenable. A far worse cause of premature delivery is malarial paroxysm.

At the third and seventh months there are risks of miscarriage naturally in some persons with such history, and better to be on the safe side in all cases of malaria in pregnancy, one may give quinine in one of the following ways. A powder or mixture like this

Calcium lactate or Gluconate	gr	5
Pot Bromide	gr	5
Sodi Bicarb	gr	10
Pul Glucose	ad gr	30

This powder each along with small divided doses, say two to three grains of quinine three or four times a day; on the first day, the second day three grains, four to five times, the next day four grains, are given three to four times. Quinine hydro-bromide appears better than hydro-chloride for pregnant patients. The dosage mentioned for the last day should be continued for two days after cessation of fever, along with powder mentioned above. Subsequently the dose of quinine may be reduced to three to four grains, four times the former and three times the latter dose per day. The patient should be

strictly confined to bed during the whole course of quinine treatment Strong purgatives should be avoided, and plenty of water and milk given to drink In cases where there is any risk, atebrin in proper doses is quite effective, safe, and harmless

• CINCHONISM, IDIOSYNCRASY, OTITIS MEDIA—ETC.—

In, quinine sensitiveness, purulent otitis media or chronic middle ear disease, exhibition of quinine is risky Three cases of complete deafness resulting from quinine medication, in subjects of malaria, with middle ear disease, came under my observation Idiosyncrasy or sensitiveness may manifest itself in, such as, nose respiratory catarrh, urticaria, vomiting, diarrhoea, sudden dyspnoea, in the susceptibles after quinine administration Cinchonism—occurs more or less in most people on even moderate doses of quinine This passes off almost as soon as the drug is discontinued Ten grains each of calcium gluconate, potassium bromide, sodium bicarbonate and one eighth of a grain of extract belladonna siccum in a powder form thrice daily may be tried in these cases of sensitiveness, and idiosyncrasy or tendency to easy cinchonism But these difficulties may easily be overcome by the use of atebrin, instead of quinine If quinine has got to be used, bromide of quinine appears better than other salts

TIME OF ADMINISTRATION OF QUININE—

For the ambulant patients who are doing their work quinine is best given as the last dose of medicine at night or one dose after each principal meals, that is twice daily and this may not be resented For the treatment of the acute attacks of benign tertian and quartan malaria, where paroxysms at the primary onset come in the forenoon, quinine may advantageously be given one dose before retiring at night, next dose early in the following morning, another dose three hours after This ensures the maximum concentration of the specific in the blood at the time the parasites break and the young but vulnerable ones are free in the circulation In malignant tertian infection the parasites go on sporulating in the internal organs almost all day and night, hence in these cases the doses of quinine are best given evenly distributed during the whole period of the day say every six to eight hourly It may also be mentioned, that in this infection the result of quinine treatment is more satisfactory than that of the other two rather benign types of malaria Because quinine reaches in effective concentration in the internal organs where these parasites of malignant malaria mostly sporulate, thus causing their easy destruction

DISGUIsing THE TASTE OF QUININE—

There are several methods of disguising the taste of quinine Some of the important ones are given below —

First method — When half an ounce of each of the two mixtures

given below are mixed, effervescence takes place, this when drunk off while effervescent, covers partly the bitter taste

Quinine hydrochloride	gr	5
Acid citric	gr	15
Aqua distillata	ad fl oz	½
Potassium bicarbonate	gr	20
Syrup Aurenti	ml	60
Aqua distil	ad fl oz	½

Second method — Quinine when mixed with milk does not taste so bitter

Third method — Glycerine in one to two dram doses mixed with either mixture or powder quinine helps in disguising the taste of the latter

Fourth method — An emulsion of half a dram of quinine powder either in an ounce of olive oil or liquid paraffin helps in masking the taste

PUERPERAL STAGE —

The strain of child birth on the system, may bring about a relapse^a of malaria in the puerperal stage. Here five to seven grains of quinine, last thing at night, preferably with mild purgatives, iron and arsenic may be of use. The prescription given for sub acute and chronic malaria with purgatives, tonics and quinine, once at night mentioned already may be quite useful

STYTON'S METHOD OF TREATMENT —

The principle is based on the fact that quinine with alkalies is more effective and tends to produce less of relapses

His routine — Three grains of calomel are given at night (this dose appears too big for an average Indian) followed by an ounce of magnesium sulphate in the morning

Three doses of the following alkaline mixture, every two hourly, commencing from 7.30 A.M.

Sodium Bicarbonate	gr	60
Sodium citrate	gr	40
Calcium Carbonate	gr	3
Aqua	ad fl oz	1

within ten minutes of the last dose of the alkaline mixture, one ten grain dose of quinine sulphate mixture, then another dose of quinine preceded by a dose of the alkaline mixture is given in a few hours

The whole course consists of a total of one hundred and eighty grains of quinine, ten grains, twice daily on the first day, thrice

duly for the next four days, then again twice for the two following days.

This dosage appears rather too big and requires reduction, according to body weight of the average Indian, specially in the light of the report of the League of Nations' expert committee.

CINCHONA FEBRIFUGE —

This is the total alkaloid of the cinchona bark—out of which most of the quinine has been extracted. Its composition varies according to the country in which it is produced. The Indian variety contains, on an average quinine—4, quinidine—22 1, cinchonine—18 5, cinchomidine—5 8 and ish—45 0 per cent. A good specimen should contain about sixty per cent of total crystallisable and the rest of non-crystallisable alkaloids. Java cinchona febrifuge contains about fifteen per cent of quinine and is a fairly useful anti-malarial drug. Being cheap it is very suitable for anti-malarial treatment among the masses. The following is a modified prescription used in the School of Tropical Medicine, Calcutta for the treatment of benign tertian and quartan infection. Against these infections cinchona febrifuge is said to be of greater use than in malignant tertian malaria where quinine is probably better.

Cinchona febrifuge	gr	10
Citric acid	gr	20
Magnesium Sulphate	gr	30
Glycerine	m	15
Aqua Chloroformii	ad fl oz	1

one dose twice or thrice daily after food, for one week.

Due to quinidine content it tends to give rise more to vomiting, nausea and other symptoms of cinchonism than quinine. Its principal constituent, cinchonine in the form of hydrochloride or bromide is used intramuscularly or orally notably against benign tertian and quartan infections. In susceptibles it may produce even convulsions. Cinchomidine is toxic and not prescribed separately. If used in five to seven grain doses, and not in ten grains thrice daily after some food, cinchona febrifuge may be quite effective for the treatment of the poorer people suffering from benign tertian and quartan malaria. The vomiting produced by this drug may be checked by suitable doses of tincture opii adrenalin chloride solution and such like remedies. Bromides calcium salts each in ten grain doses also may be useful.

TOTAQWIN —

This is another form of cinchona febrifuge with greater proportion of quinine, and is useful against all forms¹², except the very heavy

malignant tertian malaria. It is given in five to seven grain average doses, thrice daily, for one week.

SOME OF THE TASTELESS PREPARATIONS OF QUININE—

Aristolochin (*Bayer*) is a neutral carbonic ester of quinine. It is claimed to contain about 96 1 per cent of quinine, and is specially useful in pediatric practice. A white tasteless powder insoluble in water but sparingly soluble in alcohol, and is incompatible in acids and alkalies. *Dose*—For children—of one year one grain and those of two or three years—require two to three grains thrice daily. When given with equal quantity of sugar of milk it is readily taken by children. For fussy adults five to ten grain doses thrice daily may be given with some ease. Insolubility is its great drawback and hence at times, may fail to be absorbed from the intestines. Consequently it is risky to be used in urgent conditions. *Fuquamine*—It is quinine ethyl carbonate and is almost tasteless. Fletcher (1924)¹⁴ thinks it to be as useful as quinine itself though most other workers suggest that its dosage should be one and a half times greater as compared with that of quinine. *Quinine tannate*—Most workers think it to be an unsatisfactory preparation, and hence unfit for use. *Lisinosele pills*—This is a boomed Italian favourite. Each pill contains— $1\frac{1}{4}$ gr of quinine bisulphate, $\frac{1}{10}$ gr of arsenous acid, $3\frac{1}{2}$ gr ferri et ammoni citrate $\frac{1}{4}$ gr of powdered aromatics. It is to a certain extent comparable to Bacchelli's mixture. The usual curative dose for young children—one pill twice daily between seven to fourteen years, one pill four times and for adults two pills thrice daily always after some food. Preventive dose is said to be two pills a day. Though too much in vogue during the last war there appears nothing extraordinary in it.

NEWER ANTIMALARIAL REMEDIES—

In the first group of experiments replacement of the heterocyclic links of the quinoline group of drugs by some synthetic preparations resulted in these valuable antimalarial drugs.

Plasmochine—It has a big formula. Though resembles quinine, it is said to have been prepared independently of the cinchona bark. Particularly useful to sterilise the blood of the gametocytes, notably the crescents. Though somewhat effective on benign tertian and quartan schizonts it was found quite ineffective against malignant-tertian schizonts. It does not contract pregnant uterus. Being tasteless it is not disliked by children. The dose allocated is two tablets of $\frac{1}{6}$ th gr each, after food, thrice daily.

Combination with quinine—As it was ineffective against malignant tertian schizogony and in addition of quinine made it much less toxic, the preparation plasmochinone compound resulted containing $\frac{1}{6}$ gr plasmochine and two grains of quinine per tablet. Two tablets are given after food thrice daily.

Quinoplasmoquine—It was soon found out that a better product was a combination of 1/6 gr of plasmoquine with four and a half grains of quinine per tablet. Smith (1929)¹⁵, Mansfield (1931)¹⁶ and many others^{17,18} have advocated that all forms of malaria may be treated by this preparation, specially benign tertian and quartan fevers. The relapse rate is less and the system being sterilised of the gametocytes the danger of spread of malaria is much minimised. But the expert opinion of the committee of the League of Nations is that benign tertian and quartan attacks should be treated first by quinine for one week, then after a week's rest, when sufficient time has elapsed for the development of the gametocytes, treatment by quinoplasmoquine—one tablet after food thrice daily, for four days, would kill the ordinary schizont parasites left out, as well as the gametocytes which though cannot produce fever yet help in the spread of malaria from person to person. In one tube of this remedy there are twelve tablets, one tablet after food, thrice daily for an adult. A four days course is said to be quite effective.

There are numerous other combinations—like *Plasmoquine silver tonic*—containing one twenty fifth of a grain of plasmoquine and one and a half grains of quinine per tablet, with proper doses of iron, arsenic, strichnine suitable for the chronic cases. But it tends to cause constipation and hence a purgative should be given along with it. *Quinoplasmoquine*—has several other differently coloured dragees, containing variable proportions of the two active constituents, suited different ages, for the details of which the literature of Bayer company may be perused. Action—How plasmoquine acts, it is not known, but Bass suggested that the tendency towards haemolysis and production of methaemoglobinemia may create an unfavourable environment for the growth and development of the plasmodia, where quinine acts more readily and effectively.

TOXICITY AND SOME UNTOWARD SIGNS AND SYMPTOMS¹⁹ OF PLASMOQUINE GROUP—Toxic symptoms are cyanosis of the lips, toes and finger tips, cardiac arrhythmia, pain in the abdomen, vomiting, diarrhoea, haemoglobinuria, methaemoglobinemia, kidney troubles and so on. Optic neuritis, and even total blindness have been known to follow its over use. Some of the commoner untoward symptoms are—, pain in the abdomen, though less frequently met with in persons who drink plenty of water. Cyanosis is encountered in about 4.3 per cent, more noticeable in asthmatic subjects.

¹⁵ Tour R A M C Sept 1929 53 p 3

¹⁶ Ibid May and June 1931

¹⁷ Clemesha (1931) Jt Med Coll 11 p 618

¹⁸ Sinton (1930) Ind Med Gaz 65 11 p 603

¹⁹ Chopra and Choudhury (1935) Ind Med Gaz January 1935

LIMITS AND USES—Plasmquine is very useful for getting rid of the gametocytes, hence in the prevention of spread of malaria it is the valuable remedy. The dosage should be reasonable and the drug should always be given on a full stomach, in combination with quinine. For an adult a total of $\frac{1}{2}$ to $\frac{3}{4}$ gr of plasmquine per day may be effective and safe. The least sign of poisoning should prompt to discontinue the remedy.

ATEBRIN—It is derived from acridine dye and is effective against all forms of schizonts but has got no action on the gametocytes. The crescents being not at all affected by its use. The expert Committee's opinion, is in favour of its use in the primary attack of malignant tertian fever. Many workers found it quite effective in cases where quinine showed a sluggish action. To be of maximum use, the oral use of atebrin should be preceded by the exhibition of alkalies and purgatives as in quinine. It is sold in phials of fifteen tablets. One tablet after food thrice daily making up a course of five days treatment is said to be quite effective. The relapse rate is reduced, notably in contrast with the rate of relapses following quinine treatments. Hoops (1933)²⁰ recommended the following dosage, for infants a total of half a tablet, children between one to three years—half to one tablet three to five years upto one and a half tablet, persons of more than ten years age and adults three tablets, daily. These daily doses are to be divided into three equal portions—after meals say every six hourly. The temperature generally comes down in two to three days time. It may be used also as a prophylactic against malaria. It has been very useful for the treatment of malaria in pregnancy, black water fever and quinine sensitiveness. It does not tend to cause haemolysis of the red blood corpuscles. According to many atebrin is the therapy of choice in the treatment of relapse of malaria after adequate quinine medication.

ATEBRIN INJECTION—Hay (1935²¹ and others²²) have given injection of atebrin dihydrochloride, better known as atebrin musonate, in doses of 0.3 gr dissolved in five to ten c.c.m. of normal saline, intra muscularly or even intravenously, with good results. These injections were repeated the next day in a large proportion of cases and were sufficient to control the temperature in the majority²³. It may not be safe for children²⁴. These injections are indicated exactly in those circumstances which justify quinine by injection such as persistent vomiting, purging coma hyperpyrexia and so on. One

20 Hoops (1933) Brit Med Jour June 10th

21 Hay and others (1935) Ind Med Gaz Dec 1935 70 p 12-678

22 Blaze and Simeons (1935) Ibid April 1935 70 4 p 185

23 Simeons (1936) Ind Med Gaz March p 132

24 Medical Annual 1937, p 289

tablet of atebrin weighing one and a half grains is said to be equivalent to about six grains of quinine. The course of atebrin treatment should not as a rule be repeated before ten days to a fortnight after completion of the previous course.

TOXICITY —The colour of atebrin is yellow and its ingestion causes the tissues such as the skin, conjunctiva and other mucous surfaces to stain yellow. The urine becomes yellow too. When this does not follow, according to some, the remedy should be stopped, as it indicates accumulation in the tissues in a concentration which may overstep the limits of safety. Colouration is due to the medicine and not due to damage of the liver. Jaundice, colic, vomiting and diarrhoea may appear during its use. These were more pronounced in cases who took both atebrin, and some combination of plasmoquine. The symptoms are said to be due to hyperperistalsis of the stomach and spastic contractions of the intestines. It has no bad influence on the myocardium, as Chopra and his co workers (1933)^{25 26} have used it without any bad effect, on cases of malaria with endocarditis and myocarditis. In a few weak and cachectic patients atebrin has caused temporary mental derangement, to be cleared up in two to five days time on proper treatment and cessation of the drug.

On the whole, atebrin is a valuable weapon, in our fight against malaria, specially advantageous in black water fever, malaria in pregnancy, quinine sensitiveness and so on. Primary attacks of malignant tertian malaria is very well treated by it. The injectable atebrin is also an undoubted advancement in our therapy against malaria.

ORGANIC ARSENICALS —These have been used now and then for treatment of chronic malaria, with some good

25 Chopra and others (1933) Ind Med Gaz — Aug 1932 p 425

26 Ganguly (1933) Arch f Schifff u Trop Hygiene 1933—37 9, p 418

in the majority of the cases the symptoms and signs clear up and the patient gets well. Except in very persistent and usually fatal cases the disease is like an explosive attack in which the fever and the haemolysis with a severe damage to the system—are the most striking features. The rest of the clinical picture appears as an after effect of the above dominant changes.

Clinically cases have been classified according to their severity. In the milder ones the pink or red coloured urine clears up in a few to twenty four hours and the fever also drops to normal. Whereas in the more serious types, repeated paroxysms of fever accompany repeated passage of dark coloured urine which make the outlook gloomy. The disease is common in all endemic areas of malaria and no race appears immune.

Urine.—There are in it during attack methaemoglobin oxyhaemoglobin, pseudomethaemoglobin urobilin, and abundance of albumen the last constituent persisting for days after the haemoglobin has disappeared from the urine. Brown granular debris and tube casts are frequent.

Bad features—of the disease are 1 Repeated rigors 2 Anuria or persistent oliguria of a deep dark colour 3 Cyanosis 4 Exhaustion with or without hurried respiration 5 Extreme pallor 6 Hiccough 7 Frequent drenching perspiration 8 Pain in the loins with anuria which is very serious 9 Pronounced restlessness 10 Deep jaundice, as indicative of severe haemolysis 11 Continued pyrexia.

This disease has got to be differentiated from haematuria, quinine haemoglobinuria bilious remittent malaria paroxysmal hemoglobinuria haemorrhage of infective jaundice. Oxyhaemoglobinuria⁴ is suggestive of black water fever, whereas methaemoglobinuria with cyanosis may mean plasmoquine toxicity hence the importance of ascertaining if the patient received plasmoquine before the attack.

TREATMENT

Quinine should not be given—As parasites disappear from the blood after a few paroxysms and as quinine appears to be a contributory factor in the production of malarial haemoglobinuria there is now, more or less a general agreement, that quinine should not be exhibited in this disease. Deaderick in his big series of 2007 cases found a mortality of 25.5 per cent amongst those treated with quinine,—against 10.4 per cent amongst those without it.

Atebrin—Those patients who show parasites in the blood, even after haemoglobinuria, may, very usefully be treated either by injection or oral exhibition of atebrin in proper doses. For the details of this, atebrin treatment of malaria should be consulted.

GENERAL MEASURES —

Rest—It is unwise to shift the patient for treatment to a long distance during an actual attack, notably in view of the fact that

4 Fairley and Bromfield—(1934) Trans Roy Soc Trop Med & Hyg. 70 No 4, p 335

5 Amy (1934) Jour Roy Army Med Corps 1934-71 No 3, p 178 260 318

there is not much of a specific treatment to be had by such risky procedure. The weakness—exhaustion, exposure and anxiety of a transport may cause grave danger to an otherwise simple case.

Absolute rest in bed—Every possible care in nursing, warmth, suitable covering for the body, are essential. The patient should not be allowed to sit up under any circumstances. Use of bed pans should be insisted upon. Where this is not available the patient may pass his stools on a thick layer of newspaper, or some such suitable device made for this purpose. Straining at stool in a sitting posture may produce syncope.

Vomiting—As constant vomiting or nausea may interfere with the intake of liberal quantity of water—an agent very important in the treatment, one should leave no stone unturned to check it. For this the following powder may not only stop vomiting but may help to cause mild purgation, and also unburden the liver of part of its pigmentary deposits.

Hydrgarg Subchloride	gr	3/8
Chloretonate	gr	1
Menthol	gr	1/16
Sodium Bicarbonate	gr	3
Sugar of milk	ad gr	8

One powder every half an hour or fifteen minutes, according to the urgency of the symptoms, till four to eight such are given.

The other methods of combating vomiting are—

(a) To put five to ten drops of adrenalin chloride solution (1 in 1000) under the tongue—every half an hour, till four to six doses are given.

(b) Tincture iodine made of rectified spirit, may be given in one minim dose in about half an ounce of water, every one to four hourly, till three or four doses are given.

(c) In very intractable cases the following mixture may be useful,

Adrenalin chloride	m	2
Tincture Iodine (rect spt)	m	1
Acid hydrocyanic dil	m	1
Spt rectificatus	m	5
Syrup Aurenti	ad m	60
Aqua chloroformi	m	120

One dose every half an hour to two hours till four such are given.

(d) In bad cases the patient may be encouraged to drink one tumblerful of warm water with a pinch of soda in it. This when drunk off,—the patient's stomach comes in contact with a very suitable solution for stomach wash. Almost surely this will be vomited out and the

stomach will get rid of the irritant materials and subsequently any mild remedy may allay the vomiting.

Sips of green coconut water,—where available may allay the vomiting to a slight extent and is worth trying in all cases. Besides, it is a good form of soothing drink.

Plenty of fluids—The intense thirst should be thoroughly satisfied by allowing the patient liberal amounts of cold drink. Safe plain water, if cold, is very soothing to the febrile patient, and may be granted as much as he can take, the more the better.

Glucose drink—In between plain water, a glucose drink made of one to two drams of potassium citrate and four ounces of glucose to a pint of water or normal saline may be given with the added advantage of not only supplying glucose, but also combating the loss of alkali reserve of blood. It is a diuretic too. At least six to ten pints of fluid should be insisted upon to be taken by the patient. Plenty of *water glucose and alkalies* are the best weapons in our hands to combat this serious malady.

Water helps in keeping the kidneys secreting and thus prevents the blockage of the tubules by debris of haemoglobin and such other substances.

Glucose—prevents easy lysis of the corpuscles and supplies strength to the myocardium. Once glycogen is made to get stored in the liver, the restlessness and burning sensation of the patient lessen. He feels better, his frequency of vomiting is reduced, and even it may cease. In all grave cases glucose and saline should be given as a routine orally and rectally. Where the patient can not take orally and the heart is not bad, glucose in twenty five percent solution may have to be given intravenously every eight to twelve hours in fifty to hundred c.c.m. doses. When there is reason to suspect of a weak heart, fifty c.c.m. of a twelve and a half percent glucose may be given intra-muscularly every six to eight hours. In cases of dehydration, anuria, or oliguria, glucose in ten percent solution in a pint of normal saline may have to be given subcutaneously in the thighs or in the abdominal muscles. Rectally five per cent glucose saline—in four to six ounces by Murphy drip method at body temperature, with alkalies, every three to four hourly, may be of considerable service.

Subcutaneous Saline—Normal saline one pint with ten per cent glucose solution, may have to be given subcutaneously, either in the thighs or on the abdomen, every eight to twelve hours in bad cases, and specially when the urinary output is low or the patient is unwilling to drink much water or when there is much dehydration. Due to the lowered body resistance, unless very strict aseptic measures are taken, there may develop abscesses at these sites of subcutaneous saline injection. Iomentation on the local area soon after the injection may

help rapid absorption of the fluid and also prevent sepsis. Alkaline saline should never be given subcutaneously as it will invariably cause sloughing.

Alkalies — Abundance of alkalies, in the form of potassium citrate, sodium bicarbonate, in an average alkaline mixture like the following is of use, taken four hourly

Pot Acetate	gr	20
Pot Citrate	gr	20
Soda Bicarb	gr	10
Liq Ammon Acetatis	dr	2
Spt Chloroform	m	5
Syrup Aurenti	m	60
Aqua	ad fl oz	1

Hiccough — This may be due to irritation of the stomach, liver or the phrenic nerve in some part of its course, it may be due to loss of alkali reserve of the blood, (see hiccough in cholera). Hence the treatment should be according to the cause. Plenty of alkalies, glucose, stomach wash, or alkaline warm drinks to allay the irritation of the stomach, may be of some use. Adrenalin chloride solution orally, three to five drops—in an ounce of water, with a drop of acid hydrocyanic dilute, may also be tried. The anti emetic powders and mixtures may be tried with the hope that if due to gastric irritation these will show effect. A mustard plaster over the epigastrium may have to be given. But in intractable cases nothing but resumption of a normal life may cure this condition.

Anuria — (1) Plenty of fluids with alkalies and glucose as indicated above

(2) In cases of low blood pressure, this should be made to rise, so that the optimum pressure for proper filtration of urine is ensured. For this purpose fluids, stimulants to the kidneys and circulation such as subcutaneous injection of caffeine sodium benzoate in four to eight grain doses, are among the best. Diuretin orally may be useful. In bad cases pituitary, in suitable doses may do some good. Adrenalin, intramuscularly, concentrated glucose—say twenty five percent, twenty c cm per vein may serve as useful diuretics.

(3) Dry cupping or hot fomentation over the kidney region, specially when dehydration and too low blood pressure has been attended to.

(4) The kidneys should not be allowed to get chilled, as this may precipitate an acute nephritis.

(5) Warm rectal saline has been found useful in several bad cases of anuria.

(6) Warmth over the bladder This may be easily applied even in out of the way places by filling up a round bottle with hot water, and putting a very tight cork on its mouth If too hot, the bottle may be wrapped with a towel or bed sheet or some such covering

Prevention of Haemolysis—It is extremely problematic if there is any form of treatment to prevent this condition Probably the whole process stops by itself But in very bad cases intramuscular injection into the buttocks of about ten to twenty, c cm of a healthy blood relation's whole blood may be tried every twelve to twenty four hours

Intravenous injection of twenty to fifty c cm of glucose in twenty five to fifty percent solution, or ten percent glucose solution about hundred to two hundred and fifty c cm intramuscularly may be of use Extract *Casia Beniana* has been found useful by some

Avitaminosis—should be properly corrected as soon as possible For this purpose A and C vitamins⁶ appear to be of special use, and may be given by injection or orally Cantan, redoxon ascorbic acid are some of the common trade names of this pure C vitamin Liver extracts may be of distinct service campolan, hepatrat, liver extract (P & D) may prove of some use

Extreme anaemia and exhaustion—The best agent for any extreme case is *transfusion of blood* and it may save the patient by tiding him over the crisis

In myocardial weakness and exhaustion—one of the best things is glucose with insulin—given in the same manner as in cases of grave diphtheria My recent three cases of black water fever, two of a rather grave type, were treated during the acute stage with glucose and insulin with apparently very satisfactory result This is given with the idea that proper and ready oxidation and utilization of the glucose under the influence of insulin may prevent the deleterious effect due to loss of alkali reserve, and improper utilisation of glucose Glucose should be given orally by injection rectally and in as large amounts as possible It is interesting to find that Naumann (1935) also gives glucose orally and injection of insulin⁷

Hypertension—should be treated by ice or cool sponging, cold packs alcohol sponging and so on The covering of the patient should not be more than a thin sheet

6 Krishnan & Pat—paper in the 9th Science Congress Cal—1938 (Treatment of Black water fever)

7 Blackie (1937) Blood transfusion in black water fever Lancet—13th Nov p 3124

8 Naumann (1935) Arch f Schiffs u Tropenlgy 37 No 6 p 299

Calcium—This in the form of calcium gluconate given per *c.c.m.* in five *c.c.m.* doses of a ten percent solution, every six to twelve hours may be of use

Diet—As the course of the disease is self limited, not uncommonly a short one, nothing but plenty of fluids, alkalies and glucose are required during the acute stage. Fruit juice specially that of orange, pineapple, batavia or shaddock, pomegranates, grapes, green cocoanut water where available, juice of sugar canes glucose water with lemon juice and salt according to taste may be soothing drinks during the acute or subacute stage of the disease. As the patient's appetite improves, milk and its preparations, such as butter milk, whey should be added. Gradually, appetising soups and broths thickened with barley or rice or corn flour, may be allowed. In due time solids are to be added.

Later on tonics with iron and arsenic and nux vomica are of use for quick regaining of health. For this purpose—Easton's syrup, syrup minader, binim amari may be of service. A simple prescription like the following is of great use

Tincture ferri perchlor	m	15
Cal chloride	gr	10
Acid hydrochloric dil	m	15
Liq arsenic hydrochlor	m	2
Tr Nux Vomica	m	5
Syrup Aurenti	m	60
Aqua Chloroformi	ad fl oz	1

one dose twice daily after meals, in sips through a tube to prevent contact with the teeth

Constipation should always be avoided,—by some suitable aperients or saline purgatives, all throughout the disease as freely acting bowels ensure diuresis absorption of medicines and nourishment. For this purpose enemata at the asthenic and purgatives at the sthenic stage may be of service

Other drugs—Intramuscular injection of irradiated ergosterol has been given to raise the calcium content of the blood. Cholesterol in olive oil has also been tried with indifferent result

Parathyroid, calcium and vitamin D have been given with variable results

Concentrated glucose per c.c.m. is of service by (i) giving fuel and strength to the heart muscle, (ii) increasing coagulability of blood, (iii) preventing easy haemolysis and reducing acidosis (iv) causing diuresis

Diuretics—as discussed already may be of service

Cardamatis—advocates 0.01 gram of mercuric cyanide—diluted with 10 cc of glucose or sterile distilled water, given per vein, daily for two successive days then one dose on the fourth day. But one has not tried this, hence it is not possible to speak anything on its merits or demerits definitely.

Prophylaxis etc—If possible the patient should live out of the endemic zone of malaria. The blood should be examined regularly during the convalescence and when parasites are encountered—atebrin, one tablet after food thrice daily, for five to seven days, should always be given. For sterilising the blood of gametocytes plasmoquine is the only drug.

CHAPTER VI

LEISHMANIASIS.

(Kala-azar and Oriental Sore)

The clinical manifestations of this infection are varied and numerous. There are (1) The Indian form of kala azar and the infantile form of infection around the Mediterranean both showing visceral lesions (2) The other forms are the integumentary forms mostly occurring in north India and central Asia Brazil and other parts of South America (3) In case of Kala azar too, there is a cutaneous form of affection noted and has been called dermal leishmanoid

The disease is probably transmitted by the insects of sandfly group kala azar by a particular type called phlebotomus argentipes Incubation period of kala azar may extend from three weeks to three months but one has seen incubation period extending up to three years

Kala-azar—It is a chronic or less commonly an acute infectious disease, occurring in epidemic or sporadic form more commonly in the younger people caused by Leishman—Donovan bodies characterised, usually by, irregular fever progressive emaciation weakness leukopenia, enlarged liver and spleen The disease is highly fatal in the untreated There are certain common complications which may prove serious

Diagnosis—Clinically—the fever generally lacks the characteristics of malarial fever and is irregular About eighty percent will show, in some part of its course a double rise of temperature if regular four hourly charts are kept The following are very suggestive points—progressive enlargement of the spleen and liver The spleen is comparatively soft but friable there is also simultaneous enlargement of the liver During the earlier period anæmia is not pronounced as is noted in cases of malaria The tongue is generally clean bowels are not so constipated as in malaria the presence of the desire for food not uncommonly a voracious appetite even at the later stages of the disease may help to differentiate kala azar from other clinical conditions simulating it There is a peculiar pigmentation or the high mortality in the untreated which might have been instrumental in imparting the disease its name No response to anti malarial therapy is also a diagnostic point when confusion arises between this infection and malaria Generally the patient's subjective sense of illness is much lesser than the signs and symptoms would suggest This is an important point clinically

Laboratory Findings—The important ones are progressive leukopenia, the ratio between white and red blood corpuscles normally is about one to seven hundred and fifty but in kala azar the white blood corpuscles diminish and the red blood corpuscles are not much reduced numerically, hence the ratio comes to one to thousand or even fifteen hundred in advanced cases Whereas in malaria this ratio comes to one to four hundred or thereabout In the differential count, the neutrophils are much diminished and there is a relative increase of lymphocytes An average case of about three months' duration is likely to show something like the following differential count,

polymorpho-nuclears—about forty percent, lymphocytes about forty five per cent, large mononuclears about thirteen to fifteen per cent, eosinophils one to two per cent

According to Brahmachari—the globulin opacity test is important diagnostically

The aldehyde test is usually not positive before the third month hence is not of so much importance in the early stage of the disease

Chopra's—urea-stibamine test is said to be of use diagnostically during the earlier period of the disease

But by far the most important method diagnostically is the peripheral blood culture in N N N medium—incubated at twenty two degree centigrade for ten to fourteen days. The flagellate form of the Leishman Donovan bodies appear in the water of condensation in positive cases. This is diagnostic

Spleen puncture etc—This was formerly undertaken rather very frequently, but is not always free from risks. Liver puncture is advocated by Krishnan. Bone (sternum) puncture is also done. Part of the pulp got from the punctured material may be stained seen under the microscope and the other portion cultured.

In Children—The symptoms and signs may be atypical and the leukopenia, so characteristic of the disease may not be pronounced. In one case leukocytosis was encountered at the early uncomplicated stage. The fever may be irregular, pallor and anaemia are more marked in children, Anglo-Indians and Europeans. Rarely jaundice and pronouncement of abdominal veins with enlarged liver and spleen may simulate cirrhosis of the liver.

Typhoid like onset of Kala-azar—These cases may show only the irregular fever, with typical double rise in some part of its course and diarrhoea. Though this is sometimes mistaken for typhoid fever, yet the toxæmia clouding of sensorium, the dull look, the coated not uncommonly tremulous tongue, tympanites, diarrhoea, slow pulse and the other characteristic laboratory tests diagnostic of enteric group of fevers lack in this condition and thus help in the differentiation. The subject of Kala azar is generally bright, takes interest in the outer world. His tongue is as a rule clean inspite of the diarrhoea he wants to eat. The tympanites and other abdominal findings are not so pronounced as in typhoid fever. There may be enlarged liver and spleen with a blood picture and other laboratory findings typical of Kala-azar. In all doubtful cases culture of the peripheral blood for the flagellate form of the parasites may be of great help. In Kala azar the spleen may go on enlarging even during the afebrile period.

Complications are varied and numerous—The body's resistance is much lowered due to the over crowding of the reticulo-endothelial system of cells by the L D bodies. Leukopenia also causes the body to fall an easy victim to all infections. Hence in such cases any infection however trivial may take an unusually prolonged course. That is why pneumonia in subjects of Kala azar is a very serious disease and the mortality is much higher than that in healthy controls². Complications following pneumonia are also common.

Respiratory System—The commoner complications in this system, in order of their frequency, are bronchopneumonia, pneumonia with their com-

² Dhar (1937) Bearing of enlarged spleen in pneumonias, a paper read at the reunion of the Calcutta Medical College in 1937

plications, such as delayed resolution, empyema, abscess lung rarely gangrene and so on

Gastro-intestinal System—Dysentery more commonly bacillary or mixed with amoebic, than the latter alone have been described. Ascites due to various causes such as polyserositis anaemia etc., have been encountered. Superimposed or concomitant helminthic infection has been described erroneously as a complication. Cirrhosis of the liver and ascites have been described.

Septic—Cancrum oris pimplas on the skin itches susceptibility to suppuration which is difficult to cure indolent sores and ulcers are not uncommon

Hæmorrhages.—Epistaxis bleeding from the gums, are the commonest. Sometimes uterine or intestinal haemorrhage not ascribable to any thing else has been suggested to be due to this condition. In extreme cases one has seen purpuric hemorrhage

Low blood pressure is quite common with or without a rapid pulse. Agranulocytosis is recently reported³

Dermal Leishmanoid—This condition may simulate leprosy,⁴ and other skin diseases. There are generally two modes of onset, either before or after treatment⁵ of Kala azar. It is very difficult to treat

Differentiation—has got to be made from acute and chronic malaria typhoid group of fevers tuberculous infection bacillus coli pyelitis acute leukaemia endocarditis and others

TREATMENT

Early work—Some south American workers treated cutaneous Leishmaniasis in Brazil in 1913⁶ by the injections of tartaremetin with success. Earlier Italian workers used tartaremetin in the treatment of infection by Leishmania Infantum with good result. In India the earlier pioneer workers in this field were Rogers, Castellani, Muir, Brahmachari, Mackie and others.

Tolerance or Immunity—We have already seen in the case of malarial infection, that the defensive mechanism of the human system, bettered through repeated bouts of fever, is very important in the ultimate cure of that infection. The same holds good in the case of Kala azar too. So one may wait for a few weeks and allow the fever to continue, thus helping the production of systemic defence, and then exhibit the specific drug. But, as a rule, the subjective feeling of the patient is not troublesome or disabling enough, except in the typhoid like onset, to prompt him to consult a doctor. So when these patients come for medical help several weeks if not months of febrile-

³ Zia and Forkner (1936) Amer Jour Med Sci 188 No 5 p 624

⁴ Smith and Haldar (1935) Ind Med Gaz 70 No 11, p 544

⁵ Napier (1935) Ind Med Gaz 70 May p 267

⁶ Brahmachari (1928) A treatise on Kala azar, p 110 John Bale Sons and Danielsson Ltd, London

period have passed already, enabling the formation of some defence in the system. Hence once the patient comes to the doctor, treatment by the specific remedy, may be started almost immediately in the majority of subjects of kala azar.

Trivalent compounds Sodium and Potassium antimony tartrate —

These trivalent salts of antimony with sodium and potassium were the sheet anchors in the treatment of this disease before the discovery of the more potent pentavalent compounds. The trivalent compounds were given intravenously in one to two percent fresh solution, in freshly prepared distilled preferably redistilled water. The solution either should be autoclaved or sterilised by boiling shortly before use. If two percent solution is used half a c cm and one c cm of a one percent solution should be the initial dose. The dosage should be increased by half a c cm, the interval between injections generally being three to four days, or on an average two injections per week. Care should be exercised to see that no portion of this very irritant fluid leaks out of the vein if so happens almost surely a sterile abscess will follow. This will be the case specially when the potassium salt is used. In such a case the vein may be blocked to further injections.

For children, smaller doses are indicated and always a one percent solution is better. The dose should also be increased very slowly. Any severe reaction means either repetition of the same dose or even reduction of dosage.

The maximum dose for an adult usually consists in about seven c cm of a two per cent and about ten to twelve c cm of a one percent solution. The potassium salt is found to be more toxic than the sodium salt.

Reactions and toxic symptoms — Febrile reactions are quite common following these injections, and should not be seriously taken unless very excessive. Nausea, vomiting, headache, pain in the chest following injections—usually indicate a reduction in dose.

When the fever of kala azar comes down to normal and does not rise again, except due to reaction, about 25 to 3 g of the salt per hundred pounds of body weight may prove adequate. Generally in the case of an average adult three to four grams of the salt, and not the number of injections, are the criteria for adequate dosage.

Those who do not show much favourable and expected result after the injection of sodium, are given the more toxic potassium salt. Not uncommonly only a few such injections improve the case so favourably that again one can revert to injections of the sodium preparation.

The same criteria for cure, as discussed under the pentavalent compounds should hold good here too

Urea Stibamine—Brahmachari's discovery (1921) of this phenomenally potent preparation against all forms of kala azar, revolutionised the treatment. It is one of the triumphs of modern chemotherapy over diseased processes. It proves effective even in cases resisting treatment by trivalent salts and also relapses were successfully treated. They are available in following doses—0.05, 0.1, 0.15, 0.2 gram. Now a days two methods of injections are followed in giving this easily soluble preparation.

Ordinary Course—Commencing from the initial dose, two injections per week, in gradually increasing strengths, till a total of about 2.5 to 3 grams of the salt is given to an average adult.

Intensive Course—Recently Brahmachari (1933)⁷ has suggested an intensive course as is given in the treatment by neostibosan. This consists in giving an initial small dose and testing the tolerance of the patient by examination of the urine and watching for any untoward symptom. Then daily intravenous injection of 0.2 gram of urea stibamine till ten such injections, with a total of two grams of the salt, are given to an average adult. The contents of an ampoule are poured in five to ten c cm of sterile redistilled water in order to dissolve.

In younger subjects a modified intensive course appears safer to the writer. One uses the above method in two courses, each of five daily injections the dose varying directly according to the body weight, with five to seven days gap in between each course. This allows, some time for the excretion of the rather innocuous salt.

Intramuscular—Brahmachari (1933)⁸ treated fifteen cases successfully by the intramuscular injection of sodium sulphomethyl stibanilate of antimony in doses of 0.1 to 0.4 gram.

Reactions etc—Reaction and untoward symptoms are though comparatively rare, yet one has seen urticaria, vomiting difficulty in breathing, headache following these injections. But none has been so far fatal in my hands. One case of fatality however has been reported recently.⁹

There are many similar preparations in the Calcutta market about which one can not speak anything from experience. But they are expected to be good.

Neostibosan—It is an improvement on stibosan. According to Napier (1927)¹⁰ of the School of Tropical Medicine, Calcutta, this is the

⁷ Trans Roy Soc of Trop Med and Hyg 1933 January 31, p 389

⁸ Jour Trop Med Hyg—1933 January 2, 1

⁹ Nag (1937) Ind Med Gaz May 1937 p 298

¹⁰ Napier (1937) Kala azar—Milford—publication

most effective and least toxic of the pentavalent antimony compounds It may also be given intramuscularly in the following dilution

Dose	DISTILLED WATER	
	Solution 1 in 20 (5%) intravenous	Solution 1 in 4 (25%) isotonic—intramuscularly
0.05 gram	1 cc	0.2 cc
0.1 "	2 cc	0.4 cc
0.2 "	4 cc	0.8 cc
0.3 "	6 cc	1.2 cc

INTRAMUSCULAR ETC —

As a twenty five per cent solution is nearly isotonic, it may be given intramuscularly with moderate pain specially in those persons whose veins are not prominent But not uncommonly sterile abscesses may result from such intramuscular medication They should always be given into the outer and upper quadrant of the buttock It is not safe to give these intramuscular injections in the deltoid muscle

INTRAVENOUS —

The solution is directed to be prepared in the ampoule of neostibosan The syringe is filled with the required quantity of sterile redistilled water and a small portion of it is dropped into the container of neostibosan the rest of the distilled water is allowed to flow in a jet by the wall of the ampoule the latter being turned all the while round and round between the thumb and the forefinger This usually dissolves the contents completely The solution of all the pentavalent compounds should on no account be heated or boiled this makes them toxic Pentavalent preparations contained in cracked ampoules are unsafe to be used Injection should not be given after a heavy meal, and only cautiously in emaciated persons The patient should rest for sometime preferably a few hours after each injection A light carbohydrate and sugary diet is better

A powder containing the following may be given every eight hours the day before, on and after the day of these injections in order to protect the liver and to prevent the development of toxic effect of antimony This precaution is of use in all cases where organic arsenicals antimony or other heavy metals are injected

Pot Citrate	gr 20
Cal Gluconite	gr 8
Glucose Powder	ad gr 60

one powder every eight hourly, as directed above Personally one asks one's own patients to take a glass of sugar or sugar candy water

with lemon juice, one to two hours before each injection. For an average adult 0.3 grams daily¹¹, eight to ten injections consisting of a total of 2.4 to 3 g may prove adequate. An initial test dose is of value as a cautionary measure to ascertain the possible existence of sensitiveness or idiosyncrasy met with very rarely. For infants and children of two to four years an initial test dose 0.05 followed by four doses of 0.1 g., i.e., a total of about half a gram, may be adequate. Children of five to nine years should have initial test dose of 0.1 g followed by four 0.2 g making a total of about one gram. Children above nine years will require near about a total of one and a half gram of salt.

So one should bear in mind that it is not the number of injections but the total quantity of the salt in grams that is important in treating cases of kala azar. The dosage is generally based on the body weight.

Contra indications—Nephritis and ascites are as a rule, contraindications to the use of all antimony compounds in general except in those cases where the ascites may be due to the doubtful effects of kala azar. Pneumonia and jaundice demand suspension of the treatment at least for the time being. But in cases of suspected cirrhosis of the liver the drug should be withheld. Whenever there is any remote possibility of any liver damage, the remedy is to be given after flagellate culture from the blood has proved positive. Otherwise antimony salts may damage the liver further. Tuberculous subjects get worse on antimony treatment.

Relapses—With sufficiency of dosage of pentavalent compounds relapses are lesser than was the case with trivalent salts. But the adequacy of the salt in grams is the important point, and not the number of injections as already emphasised.

Resistant cases—Resistant cases should be treated by a combination of drugs. In bad cases pentavalent compounds of various types might not only have to be alternated with each other, but also a few injections of the trivalent salts even of the potassium antimony tartrate may have to be tried. But fortunately such cases are rare specially when the initial treatment has been adequate. Personally one has seen only one such case. They are very difficult to treat.

The signs and symptoms of a possible cure

Clinically—The patient gains in weight his subjective symptoms improve he feels better the temperature subsides and remains normal. The spleen gradually recedes and ultimately becomes impalpable in early or uncomplicated cases. An unusually big spleen may not become normal in six months or longer after treatment.

Laboratory tests of a cure—The total white blood count increases the neutrophil polynuclears become increased proportionally. A

leukocytosis being of good prognostic significance. The aldehyde test generally becomes negative. But the most important criterion of a cure is in a negative cultural result of peripheral blood and material derived from bone puncture.

Ancillary Treatment—The pentavalent compounds produce so striking a cure that practically very little is left to be dealt with, under this heading.

Some irritants were used formerly to produce sterile abscesses for the purpose of producing leukocytosis with not very encouraging results.

The preparations used are **T E C O** (Turpentine, camphor, crocetin in olive oil) in half to one c.c.m. doses intramuscularly into the buttocks. It is extremely painful and in private practice the patient may not see the doctor again due to the intolerable pain following these injections. Muir was an warm advocate of this remedy and method of therapy. Sodium nucleinate in suitable doses may be tried. Commonly used strength is, three c.c.m. of a four or five per cent solution subcutaneously or intramuscularly daily or on alternate days, till six to twelve are given. It causes slight leukocytosis in some cases.

Iodine Solution—intravenously—twice a week, one to two c.c.m. on alternate day or every third or fourth day may be tried.

Arsenicals—organic arsenicals such as sommin, sodium cacodylate—in two or three grain doses six to eight such intramuscularly have been tried with doubtful result.

Vaccines—In varying doses it may be of use too notably in the presence of sepsis anywhere. They may help in producing some leukocytosis.

Inflated Spleen—Some of the less irritating of the above mentioned ancillary remedies when alternated with each other may help in slight reduction of the size of a spleen not much reduced even after adequate treatment by antimony preparations. Sometimes hydragogue saline purgatives given regularly on alternate mornings, or the tonic anti malarial mixture with magnesium sulphate mentioned in the treatment of chronic malaria when taken for a long time, may help in reducing the size of the spleen.

Change of place—Change to a more dry bracing climate does not bring about much improvement in the untreated. But once adequately treated, these patients sometime improve their health remarkably through a change to a non-endemic better climate.

Treatment of Complications—To understand the basic idea guiding the treatment of the complications one should realise that the lowered resistance of the system of the patient, due to lack of proper leukocytic

response, as a result of out crowding of the reticulo-endothelial system by the parasites of kala azar, prepares the ground for all sorts of infections which the normal person might successfully resist. Hence along with the treatment of the superimposed complication, the mother disease, namely kala azar, which has paved the way, to such an infection, needs judicious and careful treatment. In such cases as soon as the urgency of the superimposed infection is less small, safely tolerated doses of the specific pentavalent antimony compound, should be given at suitable intervals.

Dysentery—When due to bacillary infection as is in most cases or in mixed types of infection, one should give bacteriophage, serum and sulphates. Along with it, as soon as the acuteness subsides, neostibosan group of drugs may have to be given cautiously and at longer intervals and in smaller doses to strike at the root of the mother disease, which helped and made possible the very grafting of the dysentery, on a body of lowered resistance.

Pneumonia—If the patient survives an attack of pneumonia, due to the stress of the infection, a leukocytosis, may, by itself favourably influence the mother disease, kala azar. But generally the leukopenia does not improve even under pneumonia. As soon as the toxic bacterial burden is over and the patient's condition permits, it is better that the kala azar should be cautiously treated. After an attack of pneumonia unless the mother disease is adequately treated there is a constant risk of the recurrence of the pneumonia next winter with even fatal result. Such an outcome is not uncommon in the experience of those who do much rural practice in kala azar affected areas. This point is of considerable importance, in view of the ultimate safety of the patient. In these cases of pneumonia, on subjects of kala azar, there is a comparative greater incidence of delayed resolution, empyema, abscess or gangrene of the lung, as compared with control healthy sufferers from this acute complication.

During the acute stage thiocol, creosote, codliver oil, orally, calcium and iodine intravenously, alternating with each other once or twice each a week, till four to six such are given, may prove useful. During convalescence vitaminous tonics specially of A and D and a diet rich in butter fruits, milk and eggs should always supplement the other average dietary.

In all these cases of complication every effort should be made to raise the threshold of resistance of the patient. In this direction the specific treatment for kala azar is of great importance and should be instituted as soon as the physical state of the patient permits. In one of the bad cases of empyema in a boy of ten years, the condition of the patient was too bad for surgical interference, but repeated aspiration of the pus and neostibosan

intravenously gave him strength to successfully undergo the resection of the rib with ultimate recovery.

Septic complications—The most serious amongst these is canerum oris, which is often the terminal event in cases of kala azar. In them, the local treatment, is of as much importance as the systemic one caused by the Leishmania Donovan. The local application of one part of trichlor acetic acid in eight parts of glycerine, soaked in cotton and kept in contact with septic area, to be changed every twelve hours, may help in the separation of the slough. The affected part may be kept in contact with cotton wool moistened with colloidal silver, or a weak lycol solution. Local irrigation and gargling by electrolytic chlorine, permanganate solution, acriflavin etc may be of some benefit. Autogenous vaccines, nuclein solution, stock vaccines are worth trying. As a rule, there is anemia of a severe degree in these subjects and to combat that successfully would be an important item in the treatment. For this—liberal doses of iron—say dram doses of ferrum et ammoni citratis—and twenty minims to half a dram of dilute hydrochloric acid, thrice daily after food, may be of use. Injections of liver extract in suitable doses, daily or on alternate days, till twelve to eighteen such are given may materially improve matters. Good vitaminous diet rich in proteins may help in building up resistance. Arsenic in small doses in the form of soamin and sodium cacodylate has an alternative, useful action. Nux vomica, Taston's syrup etc., may serve as useful tonics in all these complications. The kala azar should also be treated intermediately.

Pimples and stches,—all over the body, are quite common and require suitable management. Otitis media, mastoid or deep-seated abscesses should be treated on the above principles. A leukocytosis in all these complications is of a good significance.

Hemorrhagic—Epistaxis, bleeding from gums, uterus etc., should be treated by injections of calcium, whole blood in ten c.c.m or more, sodium citrate per vein in five to ten c.c.m doses of a ten percent solution. Horse serum, hemoplastic sera, tissue extracts etc., are of service too.

Locally strong alum lotion, adrenalin solution, viper venom, oil turpentine, liquor ferri perchlor etc., may serve useful purpose by checking the hemorrhage. For all hemorrhagic states plenty of vitamin C is of use. To prevent infectious processes to spread A, and for proper calcium metabolism and other purposes D vitamin also should be exhibited in adequate proportions.

Anemia—For the anemia big doses of iron combined with suitable amount of dilute hydrochloric acid and pepsin, are generally sufficient. Liver extract may also be useful. Plenty of fruit juice is helpful.

Children—Children may show atypical manifestations, and as often their veins are not visible, neostibosan may have to be given intramuscularly as discussed and indicated already

Dermal Leishmanoid—Out of the two types of this condition—that one which occurs before treatment of kala-azar is generally amenable to large doses of the pentavalent antimony compound and potassium iodide. But the variety which follows treatment of a case of kala azar, is extremely intractable and is very difficult indeed to treat. But the lines of treatment are the same in both. Two to three courses of pentavalent antimony compound at an interval of a few weeks, and potassium iodide in big doses may help in improving the condition slightly or considerably. Other leukocytosis producing agents and injections of irritants into the buttocks may also be tried. Vaccines got (Leishmo dermin) from the culture of these parasites may be tried in all these cases, particularly for the production of leukocytosis, if not for the specific purpose.

Newer Remedy—Very recently Napier and his co workers (1937)¹² have reported apparent cure of cases by ten daily intramuscular injection of a stable, colourless sterile solution of an antimony compound having the serial No 561, called *solutibosan*.

But it is too early to speak on its merits and demerits

ORIENTAL SORE

(*DERMIS LEISHMANIASIS*)

It is prevalent in the Punjab and North Western Frontier Province in India and also common in South West of Asia including Syria, Palestine and Northern countries of Africa and other places. The infection appears to be spread by sandfly^{1,2}.

Diagnosis.—The lesions are principally noted on the exposed parts of the body. They generally commence as papules which break down and the margin of these ulcers are generally raised and indurated. The parasites are encountered in the margins and deep in the floor of the ulcers. The sores vary widely and may show from non ulcerated papules or warty growths to large indolent looking ulcers with hard margins. The sure diagnosis is made only by finding the parasites in the material aspirated from the floor or margin of the ulcer or by culture of the materials in A.A.A. medium, and thus finding the typical flagellate forms of the parasites.

TREATMENT

Antimony Salts—Sodium or potassium tartrate or other pentavalent compounds of antimony as used in cases of kala azar may be given. The result though variable is always worth trying.

Emetine hydrochloride—Upto twenty minims of a five per cent solution of emetine, may be infiltrated round the edges and floors of the ulcers.

Berberine Sulphate—Warmia (1934)³ in addition to intravenous antimony medication, used berberine sulphate in one fourth grain doses in one c.c.m. of sterile solution—as a local injection, close to the margin of the sore. They are repeated weekly, till two or three such injections are given and are said to effect a cure.

Vaccine from culture of *L. Tropica*—Row and Ray's⁴ (1936) vaccine 0.5 to 1 c.c.m. doses subcutaneously twice a week upto seven such are used. Ray's vaccine⁵ (Leishmo dermn) was also favourably reported sometimes back. The results are promising and are worth a trial. Multiple ulcers were cured in several instances by these injections. Recently Lawrow⁶ (1937) and his co worker have produced immunity (tolerance) by injection of cultures.

1 Wenyon (1928) Brit Med Jour 11 p 558

2 Shortt, Sinton, Swaminath—(1935) Ind Jour Med Research 1923 July p 279

3 Ind Med Gaz (1934) 69 Nov p 616

4 Medical Annual—(1936) p 329

5 Thomson (1930) Proc of Roy Soc of Med 24 1, p 490

6 Lawrow and Dubowsoj (1937) Arch f Schiffs u Tropen hyg 41 No 4 p 374

CHAPTER VII

TYPHOID FEVER

Diagnosis—Diagnosis has to be made from clinical features and by laboratory aids. First the clinical points are stressed.

There are so many variations from the usual in this disease specially in children¹ that diagnosis simply on clinical data may not be possible. The fever often characteristic in type may show much atypical variations. Only one can stress on some general and frequently met facts which may be of some use diagnostically. There are other diseases which simulate typhoid fever more frequently than it simulates them. Any fever lasting for more than seven days unless proved otherwise should be suspected to be of typhoid group of infections. Coexistence of other associated diseases may make the diagnosis still more difficult.²

Onset—The onset is usually gradual, after an incubation period of generally ten to fifteen days. General malaise headache anorexia constipation may be common at the onset. Gradually the dull look of the patient begins to show itself making the name *typhus* meaning a cloud truly significant. The characteristic heavy and dull appearance not only shades the bright normal physical appearance of the patient but also his sensorium is clouded over too in the majority of cases. The fever gradually rises more or less in a step ladder like manner to be somewhat constant by the tenth day or there about. There may be bronchitis of which the patient does not complain much. Epistaxis may be common at onset but it may be a common symptom in hypertension diphtheria kala azar epidemic-dropsy blood diseases and in some other conditions as well. The pulse is usually slower in comparison with the temperature during the first few days and may show dicrotism from the second day onwards this disappears by the seventh day or later. The tongue may be tremulous and coated with white fur at the centre with a red margin and tip. A palpable and soft spleen may be found. But the spleen may be palpable in all acute infections. Diarrhoea tympanites distension come usually by the middle of second week or later. Early there may be gurgling in the coecal region but this is not characteristic of typhoid fever alone. Rose-spots are not so common in Indians but is not uncommon amongst the white patients—best seen on the abdomen and the trunk.

In a severe attack the abdominal distension diarrhea usually associated with insomnia delirium stupor subsultus tenditum convulsions coma vigil etc are generally the manifestations of a protracted fight of the system with virulent bacteria and their toxin.

Catarrhal symptoms such as coryza conjunctivitis flushed face high initial temperature with quick pulse rate are more or less against the diagnosis of typhoid fever. Though no age is exempt yet it is more common in India among the young and young adults.

Laboratory findings—Leukopenia is highly suggestive and a definite leukocytosis is more or less against the diagnosis of an uncomplicated enteric fever. In the differential count there is diminution of polymorphonuclear

¹ Hurez (1935) Thèse de Paris—1935—No 551

² Perez Medina (1935) Ibid 1935 No 101

neutrophils and eosinophil corpuscles but the mononuclear elements are relatively increased

Blood culture—When properly done it is positive in most cases during the first week and less successfully upto the tenth day or thereabout Recently a case³ is reported where culture of bile was positive Widal reaction and blood culture proving negative

Culture of Stools—Fresh stools generally show the *Enterobacter typhi*—organism from the second week and almost to the end in some cases **Urine Culture**—This may show the bacilli by the third week or later on

Gruber Widal reaction—Specific agglutination phenomenon seldom appears before seventh or eighth day and when persistently positive or shows positive reaction in gradually ascending dilutions and when the clinical symptoms warrant a diagnosis of typhoid fever is most likely H agglutinin is specific, and O agglutinin is a group reaction But the question of recent prophylactic inoculation against typhoid infection should be out ruled before this is seriously accepted With proper technic a positive reaction of one in hundred of O agglutinin is highly suggestive of this infection

Marris's atropine test—This test is not always dependable and gives doubtful results in toxic patients and elderly subjects

The diazo reaction—It may be helpful when the clinical symptoms are in favour But a positive reaction is got in measles typhus fever, pneumonia tuberculosis and erysipelas

Commoner Complications,—early or late are —haemorrhage perforation proctitis thrombosis of the veins most commonly of the left iliac due to its peculiar anatomical position cholecystitis abscesses of the skin pneumonia —hypostatic or infective Bed sore though common is more due to improper nursing than due to anything else Hyperpyrexia recrudescence and relapse may occur

Differentiation—however has not to be made from remittent type of malaria acute hantavirus tuberculosis sepsis and other fevers of continued type

TREATMENT

PROPHYLAXIS—There may be no definite certainty about the life of a person infected by *Enterobacter typhi*, but those persons who are not yet affected may however always be protected by inoculation of a typhoid and para A and B vaccine⁴, in suitable doses, according to the age, weight, sex etc , of the subject to be protected and by keeping him off the risks of infection Two such preventive inoculations at the interval of a week to ten days often confer sufficient immunity either to abort the disease, or show only milder manifestations even when attacked But persons in the incubation period should not be inoculated Strict care should always be observed to see that the infective materials, such as stool, urine, soiled linen before being washed properly away from sources of drinking water, are disinfected The stools should be made to come in contact with sufficient active bleaching powder for at least two to three hours Hard

³ Castellanos and others (1936) Arch de Med inf Havana 1936 v 376

⁴ Castellani (1936) Polichimico 1936, 43 1537

faeces should be liquified to bring the disinfectants in intimate contact. The urine is disinfected by one in twenty carbolic lotion or one in five hundred corrosive sublimate solution, to which five per cent of strong hydrochloric acid has been added. The sputum should also similarly be dealt with. Soiled linen should not be allowed to be dried up but steeped immediately into corrosive sublimate solution. Bed pans, urine pots, enema syringes, thermometers, and other articles used by the patient should be properly sterilised and the needful done. Every doctor in our country needs bear in mind the laws of prophylaxis, and should have the dual function of curing and preventing diseases.

GENERAL MEASURES —

Room — The room should be free from unnecessary furniture. It should be well ventilated and preferably have access of sunshine in the winter and suitable shade and coolness for the hotter days of the year. An adjoining bath room facilitates disinfection and disposal of the faeces. In our tropical country a suitably protected verandah may be utilised for the use of the patient.

Bed etc — The bed should be such as to allow easy access from the sides. A single bed of moderate height of about two feet or so is suitable. The mattress should be elastic and covered by a blanket and the covering sheet should have an oil cloth or rubber cloth underneath. The bed sheet should be drawn smooth to make it free from wrinkles. Dryness and cleanliness are great factors in preventing discomfort and in very ill patients the formation of bed sores. To serve as a cover a sheet with a light blanket is sufficient. One low pillow not too soft, may be of comfort.

Rest — Absolute rest physical and mental should always be insisted upon. Bed pans and urine pots should be used by the patient in the recumbent posture. This may be difficult for him at the beginning, but a little persuasion by the nurse and effort on the part of the patient will set matters right. Visitors are better avoided altogether.

Nursing etc — Nurses and the attendants should be protected by preventive inoculation and wear overalls and gloves where possible. Careful disinfection of their hands finger nails etc., before leaving the patient, after duty, is imperative. Four hourly temperature pulse respiration records are of service. An accurate record of food and fluid intake and the amount of urine and the number of stools passed, the nature and time of sleep, are very useful to assess the value of treatment and good nursing. A sufficiency of urine passed by the patient is of great importance and shows that he is receiving enough of fluids, which is one of the best if not, the best of medicines, in the treatment of enteric fever.

Any symptoms suggestive of haemorrhage or perforation should prompt the attendants to inform the doctor immediately.

Mouth—The mouth should be kept clean by regular mouth washes after each meal. If the patient is conscious and able he may use the tooth brush and some good paste. In most cases the cleansing of the teeth is advantageously done by a soft linen-wrapped round the finger specially after each feed. If there is much thick tenacious mucus, an alkaline saline wash or gargle may be of use. A cotton swab dipped in alkaline antiseptic lotion serves this purpose of cleansing very well. Ulcers or denudation of the epithelium of the buccal mucosa should be touched either with tincture iodine or four per cent mercurochrome solution. Any hard crust formed around the nostril or the mouth may be softened either with boro vaseline or liquid paraffin and gradually removed. As a preventive against parotitis the patient's tongue should be touched twice daily with a swab dipped in clove oil or some such irritant or sour material or chewing gum which causes flow of saliva.

Skin—The centripetal impulse of high temperature originating from the skin keeps the brain awake in cases of high temperature persisting for a length of time. If this vicious circle is broken by a tepid or cool sponging twice or more frequently then the patient may be able to sleep and that to his great advantage.

The bed sores are very troublesome, and are best prevented by careful nursing. After the patient has passed urine or faeces he should be cleaned immediately, first, by wet sponging, dried, then dusted liberally with some good dusting powder with a large percentage of zinc oxide in it. Special care being taken for the scrotum or vulva and the natal cleft. A regular and routine use of alum water made by putting a block of alum for a few minutes in bath water before the routine morning and evening sponging, often prevents the easy development of bed sores. The skin at the pressure points should be hardened by four hourly application of methylated spirit followed by theunction of an ointment containing one dram each of zinc oxide, boric acid and tincture benzoin compound per ounce of white vaseline. As most of these serious cases of enteric fever remain unconscious during the fastigium, the attendants or the nurse should try to follow the above routine and always keep a watchful eye to change the soiled linen and do the suggested toilet without the patient having asked for them. An air cushion or air rings may spare the pressure points from bed sore. Air or water beds are not generally required.

The patients if elderly or of a weak heart, should be changed from side to side from the usual dorsal decubitus, and the position maintained by suitable support of pillows. Morning and evening sponging should be started with tepid water. If there is a higher temperature than 102.5°F , the water for sponging should be gradually cooled down till just cool to the touch and this should be used to finish the terminal

part of sponging, lasting about fifteen minutes or more. *Inusion*, which tends to raise the blood pressure, is a very important item in the bath treatment. Voluntary effort or any exertion during bath is detrimental. The feet of the enteric patient may have to be kept supported as foot drop may take place in prolonged fever.

Retention of Urine—In the unconscious or weak feeble patients this may cause much restlessness best relieved either by hot fomentation or an enema. If these fail a soft rubber catheter may be used with all aseptic precautions. Tincture belladonna in five to seven drops and warm rectal saline or enema may obviate the necessity of catheterisation.

Antipyretics—Antipyretics such as aristochin and ergogenin in two grain doses each may be given twice daily at four hourly interval in the evening for the fever lingering at the fag end of the disease, which resists all other forms of treatment. Though coal tar derivatives are not always safe.

In addition to details in the examination of the fever charts stool and urine one should scrutinise to ascertain the degree of meteorism, distension of the bladder or other complications. It should also be kept in mind that there may come such complications as venous thrombosis, cardiac failure, hemorrhage, perforation and many others.

Diet—During the height of the fever the patient does not like to take any food except liquids. Glucose water, butter milk, fruit juice, drinks sweetened by lactose may be given in four to eight ounces every two to three hours. Though the usual requirement of about 3000 calories for an average young adult during the febrile stage can not be kept up here yet for all practical purposes if given only plenty of liquids at the height of the fever even with extreme loss of appetite the patients do well. But during the early or later stages with some desire for food yet left, besides milk sweetened with glucose, one can easily give boiled smashed potatoes with half boiled egg or milk or broth or soups. Boiled soft rice with milk and egg in the form of a pudding is a very palatable form of diet liked by most young patients. About four ounces of milk better skimmed diluted with two more ounces of either barley water or gruel may be given every two hours. In cases of diarrhoea the stool is generally acid to litmus, and is due to too much of sugar in the diet and this indicates with holding specially of sugars and carbohydrates. Substitution of these by albumin water or vegetable soup or simple plain water, alum whey, Mellin's food for about twelve to twenty-four hours or so may improve meteorism and diarrhoea. 'The introduction of the full diet in the therapeutics of typhoid fever is the greatest contribution of all time toward the control of the malady'.⁵ In the past the morbid

⁵ Beckman (1930) Treatment in general practice p 256 (Saunders Publication)

and unwarranted fear of haemorrhage and perforation etc, made doctors, stick to a low dietary causing inanition and exhaustion—which in their turn instead of preventing the intestinal complications tended to make them more frequent. Amongst the commoner articles of diet which may be given to a patient of typhoid fever who has some appetite left are—boiled fish, soft boiled or poached egg, boiled rice, fruit juice, milk preparations, soft bread and butter, cream and soups, but the latter two articles may induce diarrhoea hence should not be given to cases with loose bowels. Lactose and glucose which are monosaccharides are better than cane sugar. Lactose causes least intestinal fermentation, but too much should not be given. Care should be taken to see that too much diet is not given, as this may conduce to diarrhoea. Carbohydrates are protein spares and should be blended suitably with other articles of diet, or given alone. A variety in the diet is also of importance. As the appetite improves the quantity and quality of food should be increased. Fever need not necessarily stand in the way of giving a liberal diet, provided, there is an appetite and liking for it. But this should be pushed short of inducing diarrhoea or indigestion. Vitamin rich diet should always be aimed at, specially in view of the prolonged illness.

Solid Diet—There is the customary plan of giving solid food after the patient's fever remains normal for three days. But this need not necessarily be the criterion in every case. The appetite, assimilatory and digestive capacity of the individual should be our main guides. Soft boiled eggs, boiled fish, bread and butter, puddings, milk preparations, potatoes, cream, cold jellies, ice-cream, soft boiled rice may be allowed in those cases with unimpaired digestion. Meat is not a suitable diet for these patients, specially if there is much fever.

Except in very weak and exhausted or unconscious patients alcohol is better withheld altogether. Those few patients who are in the habit of drinking may be allowed alcohol in dram to two drams every three hourly or so.

Toxaemia—This is best combated by hydrotherapy internal and external. There may be highly toxic cases of typhoid fever in the late second to even the end of fourth or fifth week and the best means to combat this lie in giving about eight to ten pints of cold water orally, saline subcutaneously and in rare suitable cases rectally, so that enough urine, of about fifty ounces or more are passed. Rectal saline of the following formula—

Glucose powder	oz. 1
Sodium Bicarbonate	gr. 60
Normal saline	pint 1

In four to six ounces may be used every three hourly for an adult

But rectal sponges are not generally suitable for typhoid cases, as this may start the hitherto absent diarrhoea, causing considerable disturbance to the patient. Hence it should never be advised unless very urgently required and that after due consideration.

Subcutaneous Saline.—One pint of saline given in the subcutaneous tissues, every eight to twelve hours is generally very painful—and may result in subsequent suppuration. But it is recommended on the ground that it combats the toxæmia, thus may be instrumental in saving the life of the patient. So subsequent formation of abscesses is the lesser of the two evils.

One can add with advantage about two ounces of glucose to the saline and sterilise it properly before injection. Glucose saline is more useful than simple saline.

Fluids Orally.—By far the ideal method of giving enough fluid is to offer the patient about four to eight ounces of water every half an hour or so besides the liquid given along with the feeds. Plenty of green cocoanut water drinks where available may be to the liking of the patient.

Delirium.—The term is derived from the Latin derivative de lira, a furrow, meaning that the patient's mental processes have become deviated or de furrowed from the straight and narrow path of sanity.⁶ As a rule delirium is mainly due to intense toxæmia and hence all measures to reduce the latter should be adopted as suggested above. Generally it is more marked at night and not uncommonly only muttering in character—though it may be of a violent type specially, in very toxic cases or in those who are in the habit of drinking alcohol. Such a violently delirious patient may cause injury to himself when left alone hence an attendant should always watch him. A large draw sheet may well be utilised for restraint by drawing it over the body of the patient and having kept folded into the sides of the bed. In mild cases ice cap on the head may be tried. If possible oral administration of one to two drams of paraldehyde, or ten to fifteen grains each of chloral hydrate and bromide may be given every six hourly. In patients who won't drink any medicine, double the dose of the above sedatives may be given high up rectally with some effect.

Bath Sponging etc.—Cold sponging, cold bath are very useful in toxic cases. Bath treatment, though not convenient for private practice yet should be taken resort to wherever possible. The beneficial effects of these are varied and numerous. Ice cradle, is a device, like that of an electric bath, from the rods of which are hung about half a dozen of either ice bags or small flannel covered buckets full of ice

⁶ Purves-Stewart (1937) Diagnosis of Nervous diseases Eighth edition p. 111 Edward Arnold Publication

The bags or the buckets are covered either by felt or flannel to prevent the water of condensation soaking the bed clothes of the patient. The whole ice cradle and the patient are covered by one or two thick blankets to prevent the cold from radiation. The patient is to be covered only by a thin sheet, and his temperature taken every half an hour—and the feet and leg covered by blanket and kept warm by hot water bags or bottles. The cradle is kept in position till the temperature comes down upto 101 to 102°F. Chill felt by the patient is often disregarded and may be salutary in function. Cold packs are also of use.

CARDIO VASOMOTOR WEAKNESS —

At the height of the illness, with toxæmia and high temperature, there is usually some degree of cardio vasomotor weakness. For this cool sponging, or cold bath with continued friction and prolonged contact of the skin with cool water is of service and helps by raising the blood pressure. Digitalis group of drugs appear not of much use here. Coramine, cardiazol, teritol in suitable doses may be tried every six hourly. A useful combination—is the following, given intramuscularly every four to six hourly,

Strychnine Sulph or hydrochlor	gr	1/100
Atropine sulphate	gr	1/200
Adrenalin	m	5

When the pulse is very quick and there are no signs of respiratory involvement atropine in the above prescription may be substituted by either strophanthin one c cm or digoxin—in suitable doses till the pulse is reasonably slowed down. But in enteric fever due to action of the toxin the heart is more or less slower in comparison with the temperature. Some workers advocate half a c cm of pituitrin every eight hourly in cardiac weakness, notably when in association with meteorism.

Cyanosis and dyspœa indicate giving of oxygen, by intranasal method, through a soft catheter at a brisk rate (see pneumonia).

Injection of glucose and insulin appears also to be good for the heart. Such other remedies like caffein sodium benzoate, strychnine and digitalin camphor in oil or ether, may be injected every six to eight hourly according to indication.

TREATMENT OF SPECIAL SYMPTOMS AND SOME COMMON COMPLICATIONS —

Alimentary system—Constipation Many cases, specially when properly managed or of a mild type may show constipation all throughout the course of the disease. This should be relieved better by glycerine enema—of an ounce each of water and glycerine given either by a glass syringe or an enema. Glycerine suppositories may also be used. Ordinary normal saline enema of not more than half a

But care should always be taken to see that the compress is not too hot to burn the skin. Twenty to thirty minutes spent for this purpose often suffice. In some cases application of ice over the abdomen may be more suitable than warmth.

Turpentine enema consisting of half an ounce of the oil turpentine stirred in six to eight ounces of starch water, given high up rectally and left therein may relieve distension. In extreme cases injection of half a c cm of pituitrin or $\frac{1}{50}$ gr of eserine or one grain or $1\frac{1}{2}$ gr of acetylcholine repeated every six to eight hours may be the last useful remedy. Lavage of the intestines by two to four pints of warm saline, with great care and gentleness may be of some effect.

High Rectal tube—A flatus tube or in its absence, a stout catheter may be passed high up about ten to twelve inches or higher and allowed to remain there for a few minutes to half an hour. The patient may have to be turned from side to side to facilitate escape of wind.

Milk and Molasses—In out of the way places eight ounces each of milk and molasses warmed to a thin consistency, cooled at body temperature, may be used with advantage as a high retention enema in these cases of gaseous distension of the abdomen.

Hæmorrhage—The important points diagnostically are,—by the second or third week or later in the disease there is a sudden drop of the temperature below normal specially in severe hæmorrhage. Gradual and comparative quickness of the pulse is present and the latter tends to be thready, soft and compressible. In extreme cases there may be beads of perspiration appearing on the forehead. Paleness, restlessness, hurried respiration may indicate a severe hæmorrhage. Later on tarry stool is diagnostic. In small hæmorrhage there may not be a subnormal temperature. The spleen may shrink in size.

Management —

Absolute rest physical and mental should be ensured—For this purpose besides a quiet dark room, one fourth to one sixth of a grain of morphine with one hundredth of a grain of atropine, may have to be given subcutaneously; specially when there is much restlessness. The disadvantage of morphine atropine is that the former tends to mask local symptoms, and as one fifth of the cases of perforation are accom- pained by hæmorrhage this may interfere with the diagnosis of the former condition. In doubtful cases luminal group or chloral and bromide should be given to combat the restlessness, and morphine withheld, till perforation is excluded.

During the use of bed pails the exertion may be too much, hence they are preferably avoided, and only towels or several folds of news paper used to collect the faeces and every motion kept for inspection.

An ice cap lightly touching the right iliac region hung from a cradle, should not be kept for more than a day. Between the skin and the ice cap there should be a layer of lint or flannel. But it may promote peristalsis in some cases. The foot end of the bed may have to be raised by bricks or blocks of wood notably in severe haemorrhage and the feet of the patient kept warm. No food is allowed for first twenty four hours except small sips of cold water or bits of ice to suck. Then milk or its modifications are given in small amounts cooled properly. Some believe in giving sips of a mixture, containing one dram of adrenalin chloride solution in eight ounces of distilled water cooled. But this is not likely to be of much use as the ulcers are too low down to be influenced by this therapy. The blood though gets clotted at the site of leaking by the gradual lowering of blood pressure by nature, yet we have to try something.

Hæmostatics —One of the efficient is one grain of calcium chloride in ten minims of sterile water given deep into the muscles of the buttock. This helps probably by mobilising blood calcium. Calcium gluconate ten per cent solution in five c cm doses intramuscularly or per vein may be tried. If *hole blood* ten c cm from the nearest healthy relation given intramuscularly may be of use. Horse serum, even antitoxins may be given. *Congo red solution*—ten c cm of a one per cent solution per vein is reported favourably by some. Sodium citrate solution five to ten c cm of a ten per cent solution intramuscularly or intravenously may be of service. These may have to be repeated every twelve hourly, according to indication. Congo red probably acts by the stimulation of the reticulo endothelial system sodium citrate by destruction of the blood platelets.

Saline —Subcutaneous saline one pint, with ten per cent glucose may have to be given every twelve hours in cases of haemorrhage, to combat dehydration and starvation. But this should preferably be started after twelve to twenty four hours giving enough time for the formation of a hard clot and then help to increase the volume of blood. Some believe in giving turpentine in the form of an emulsion—in ten to twenty minum doses every three to six hourly, but the risk of kidney damage should always be borne in mind.

Low blood pressure following haemorrhage need not alarm one as it is nature's method of producing the clot and stopping the bleeding.

Subsequent Constipation —This, following haemorrhage should not bother the doctor, unless there are symptoms. Straining at stool should be avoided. Oil enema or glycerine and water rectally may be tried on the third or fourth day.

Perforation —All abdominal pains in typhoid fever after the first week should be taken seriously and unless proved otherwise indicate

perforation? The symptoms are—sudden onset of abdominal pain late in the second week or later in the disease—associated with nausea, vomiting and symptoms of shock, sudden increase in pulse and respiration rate. Temperature falls, then may rise, obliteration of the liver dullness, rigidity locally and symptoms of an acute abdomen may be found. Polyuria may precede perforation.

Surgical intervention should be immediate and prompt in order to save the life of the patient. A case of perforation in typhoid fever on the twenty second day in a boy of twelve years was saved in the Medical College Hospitals, Calcutta by timely operation. When conservative treatment has got to be resorted to, due to the patient being beyond the reach of surgical aid, Fowler's position, warmth, fluid, saline glucose injections are indicated. Absolute rest, morphine atropine for pain may cause euthanasia in a case of perforation, beyond the reach of proper surgical interference.

Cholecystitis—This is diagnosed by local pain, rise of temperature, quick pulse, palpable tender gall bladder etc. Treatment consists in giving glucose alkalies and urotropine orally and intravenous injection of forty per cent solution of urotropine five to ten c cm with glucose twenty five per cent five to ten c cm twice daily. Locally, fomentation, linseed poultice, antiphlogistine are of benefit. The following prescription with or without decholin may be used with good result.

Urotropine	gr	10 to 30
Sodi Bicarbonate	gr	20 to 60
Tr Belladonna	m	6
Syrup Aurenti	m	60
Aqua Chloroformi	ad fl oz	1

one dose four times a day. But in rare cases urotropine may produce haematuria specially when given along with acid mixture. Some use cylotropin too.

Parotitis—Improper oral hygiene, want of suitable toilet of the mouth, bad teeth, dorsal decubitus for a long time allowing free access of bacteria directly through the parotid duct, even by gravity, and want of the flow of the salivary secretion and so on appear to contribute to the infection of these glands.

The flow of the secretion is promoted by asking the patient to chew either some cloves, ginger or sour lemon every two to four hours. In unconscious persons the tongue may be touched with a swab dipped in either oil of cloves or cinnamon or even peppermint every few hours. Locally warmth may be applied over the gland in the form of hot compress or fomentation or antiphlogistine or

poultice Four to six hourly gargling the mouth with a solution like the following has given satisfactory results

Menthol	gr	10
Oil Cloves	m	30
Rect Spirit	m	120
Glycerine	m	60
Saturated solution of Mag Sulph		
	ad fl oz	8

Listerine group of mouth washes, used twice daily may prevent it Locally an ichthiol and collodian paint of the following type on the skin over the inflamed gland may be useful

Ichthiol	m	120
Extract Belladonna Sicum	gr	10
Collodian	ad fl oz	1

to paint on the parotid region three or four times a day

Phlebitis—The commonest site of thrombosis is left femoral vein because of its anatomical position The leg should be elevated—and kept at rest on a pillow One should never allow the limb or the thrombosed parts to be rubbed Movements are better avoided, but when indispensable, need great care Cold compress or ice application given very lightly avoiding friction or pressure, specially at the onset may do good Warm flannel bandage or cotton wool wrapping lightly applied and the parts kept covered and warm is of benefit Bath and massage should always be avoided

Amongst the drugs recommended for oral use is sodium citrate in twenty to thirty grains thrice daily Thyrovin or extract thyroid is said to be of use Potassium iodide and sodium salicylate in four grains each with ten grains of sodium bicarbonate three or four times a day, may be effective Injections of germanin or foreign protein, have their advocates Prolonged rest for a period of at least four to six weeks is probably the most important item in the treatment

Typhoid Bacilluria—This is best treated by exhibition orally of hexamine and ammonchloride in ten to fifteen grain doses each by the third or fourth week of the illness

Cystitis,—may have to be treated on its own lines Hexamine treatment, should either precede or follow alkaline treatment (see Cystitis)

Bone lesions—This somewhat rare complication may take place either at the height or decline of the fever Pain in the bony regions with other signs of inflammation are the first to attract attention Application of ice bag over the area is soothing and causes the

swelling to subside When it suppurates draining should be done and a surgeon consulted

Typhoid Spine—Though, fortunately very rare, demands perfect immobilisation, local rest avoidance of strain etc The opinion of a surgeon may be of great help

Tender toes—These should be treated by the application of tincture iodine and hot compresses

Multiple boils—The parts should be kept clean, aseptic and dry The skin should not be allowed to get sodden Injections of colloid manganese or oral use of moalan may do some good The general resistance of the patient should be raised by proper diet, rich in all the vitamins Auto vaccines given subcutaneously may be tried

Drug Treatment—No specifics are of any value Intestinal antiseptics are of doubtful efficacy Some are in favour of giving *tincture fern perchloride* in ten to fifteen minims doses thrice or four times a day, and it may help in keeping the metabolism and fermentation down During the earlier febrile stage an *ordinary alkaline mixture* is given by most physicians to be followed later on in about the second week by an *acid mixture* the active constituent of which is dilute hydrochloric acid The average prescriptions are

Alkaline mixture—

Potassium acetate	gr	10
Soda Bicarbonate	gr	10
Pot Citrate	gr	10
Liquor Ammon Acetatis	m	60
Syrup Aurenti	m	60
Aqua chloroformi	ad fl oz	1

one dose, three to four times a day

The acid mixture—

Acid hydrochloric dil	m	10 to 30
Tincture Fern Perchlor	m	10
Syrup Aurenti	m	60
Aqua menthpip	ad fl oz	1

one dose thrice daily after some food This acid treatment appears of use and is worth a trial,

The old *Chlorine mixture* has fallen into disuse It is prepared like this In an amber coloured glass stoppered phial, in fifteen grains of potassium chlorate, thirty minims of strong hydrochloric acid are added Water is poured into it slowly, the phial being shaken, all the time, to make upto six ounces To this nowadays about eighteen grains of quinine are often added It is made into six doses, one dose thrice daily

Convalescence—Careful management of the convalescence is of great significance, as relapses with some complications may appear during this time. The diet should be increased very slowly, and with due consideration to the severity of the disease, condition of the patient, his appetite, digestion and so on. Every case should be individualised on its own merits. The patient should be allowed to sit upon the bed for gradually increasing hours, generally seven to fourteen days after defervescence. Seldom the patient is fit to resume work before two to three months rest is given preferably in a better and bracing climate. Gradually the diet should be made rich in the vitamins, fruits, milk, egg, butter etc., meat is to be added cautiously.

Not uncommonly *excitement, too much reading, prolonged talk* with visitors cause a rise in the evening temperature. For such cases a quiet and more restful living during convalescence is indicated. There also are cases with a persistent evening rise of temperature without any obvious cause. They are sometimes best controlled either by Bruschettini's vaccine or a powder like the following given orally.

Cryogenin	gr	1 to 2
Aristochin	gr	2
Cal Lactate	gr	5
Sugar of milk	ad gr	12

one powder every four hours in the afternoon till two such are taken. Cryogenin may make the digestion a bit dull, but that only temporarily.

Unduly slow or quick pulse generally requires no treatment. Return to work should be cautious and gradual according to the nature, and duration of the work and the severity, type and length of the illness.

Tonic—In most of the cases a tonic containing iron, arsenic, nux vomica, hydrochloric acid, given after meals in suitable doses may be of distinct use to hasten the recovery.

*Carrriers*¹³—These convalescent carriers may be the sources of future epidemics by periodic excretion of showers of bacilli either in the stool or the urine¹⁴. The gall bladder once infected is extremely difficult to sterilise. Massive doses of vaccine was tried without success but recently the gall bladder is being removed¹⁵ with variable result. There is greater incidence of gall stones in these persons who suffered from typhoid fever than in those who were not infected.

13 Jour Amer Med Assoc (1936), 106 p 1826

14 Hassen (1935) N Y State Jour Med 1935 35 p 1206

15 Coller and Forsbeck (1937) Ann of Surg 1937 105 p 791

CHAPTER VIII

PNEUMONIA

Epidemiology—These groups of diseases appear to be on the increase in big cities due to over crowding lowered resistance resulting either from some concomitant debilitating disease or due to less of out door life, greater facilities of transport of carriers crowding in halls of amusements etc. Since the last pandemic of influenza—there is a greater tendency to bronchopneumonia than to lobar pneumonia¹. Though in the typical cases diplococcus pneumoniae is the causative agent—yet there may be strepto or staphylo cocci, pneumo bacilli micrococcus catarrhalis etc. present specially in atypical ones. Pneumonias are common during the winter months.

Aetiologically.—Increased virulence of the microbes lowered body resistance due to sudden exposure to cold trauma immersion in water or getting soaked in rains unsuitable and insanitary dusty or dirty occupation tend to help in the spread of the disease by droplets and other modes. There may be aspiration or inhalation pneumonia. Death rate is higher during the dry months than in humid atmospheric conditions.

Predisposition.—Is caused by all debilitating affections—such as alcoholism diabetes mellitus cancer cirrhosis liver tuberculosis nephritis arteriosclerosis heart disease influenza typhoid fever, pulmonary tuberculosis and so on. A previous attack makes the patient more susceptible to another.

Diagnosis.—There is hardly any disease which is more easy to diagnose than a typical case of lobar pneumonia. Atypical ones may be confounded with acute tuberculous pneumonia in extremes of age with bronchopneumonia pulmonary congestion and infarct atelectasis and important of all pleural effusion. In central pneumonia there may be difficulty in diagnosis even for days.

But generally the characteristic type of onset with chill and rigor, pain in the chest altered pulse respiration ratio high rise of temperature the hot burning often dry skin the peculiar breathing suggest the disease. There is as a rule a cough and after a time rusty sputum. Herpes is not so common in our country. By palpitation a greater resistance is felt on the diseased side. Percussion note may be dull or flat on the affected side of the chest as compared with its healthy fellow. Air entry, at the early stages in the affected side specially near the hilar regions on the back, is either poor or deficient. Later on the breath sound changes to the characteristic tubular type. The vocal fremitus and resonance is increased on the affected side. Pneumonia is a disease of protean manifestations and present abnormalities in type specially in the debilitated persons and at extremes of age. There may be even fatal pneumonia in persons of very low vitality without any fever. Whenever we have to deal with fever of uncertain origin the lungs should be repeatedly and carefully examined. It is only by an unceasing vigilance that we can diagnose unsuspected cases of pneumonia.

1 Wynn (1932) Medical Annual 1932 Pneumonia etc

2 Norris and Farley (1925) Oslers Modern Medicine vol I Lobar Pneumonia p 186 Lea and Febiger publication

Besides the above the characteristic temperature chart, showing high continuous fever, coming down by crisis on odd fifth to eleventh days points to the probability of the disease. Blood culture for diplococcus pneumoniae may be helpful where such facilities are available. Absence of leukocytosis speaks strongly against pneumonia, except in very mild or very toxic cases. Delirium, quick feeble pulse of low pressure tympanites are common in virulent toxic infection. Meteorism and tympanites interfere with the proper movement of the lungs hence are of bad import. Diarrhoea jaundice, are common, especially in severe attacks.

Differentiation,—has got to be made from influenza complicated with pneumonia. Commonly influenzal attacks accompany broncho-pneumonia and they may have to be differentiated from lobar pneumonia, pleural effusion, sub-diaphragmatic abscess, inter lobar empyema, abdominal inflammations, and other conditions likely to be confused with pneumonia group of diseases.

Complications are varied and numerous.—Delayed resolution is common in cases where there is out crowding of the reticulo-endothelial system as in kala azar. Empyemal abscess, gangrene are not uncommon too in the debilitated or under nourished subjects and also in subjects of kala azar. Meningitis, otitis media, peritonitis, arthritis are also encountered. Various types and grades of heart involvement are also not uncommon. Albuminuria is frequent. Mediastinitis is rare.

Sequelæ,—are liability to subsequent attacks, some permanent pleural thickening rarely fibrosis and bronchiectasis, the latter two are more common after lobular than after lobar pneumonia.

Culture of the sputum and skingraphic examination of the chest are being utilised recently in America³ for early diagnosis and typing of the infecting organism—for prompt serum treatment.

Mortality rate—This varies besides other causes according to the age and former health of the individual, the type of the pneumococci concerned and the severity of the infection. Marked debility with some of the chronic exhausting diseases, in fat persons and in diabetics, alcoholics and others the out-look is bad. Severity of toxemia and supervention of complications or not want of good leukocytosis and temperature too low blood pressure are all factors modifying the prognosis for the worse.

Broncho-pneumonia or Lobular Pneumonia—It is commonly met with in extremes of age—and is usually secondary to attack of some other infections such as influenza, measles, whooping cough, diphtheria and so on. The temperature is irregular and more prolonged and with greater fluctuations. The signs in the lungs are patchy and bilaterally distributed with variable areas of consolidation and healthy patches intervening between each other. There are rhonchi and suggestive adventitious sounds in both the lungs. This type of infection even in adult life is not uncommon now a days specially since pandemic of influenza of 1918-19. The complications, sequela etc., are almost the same as in cases of lobar pneumonia.

TREATMENT

Though there is difference of opinion as to the details of the methods of treatment of pneumonia or broncho pneumonia, yet on the broad principles there appears, more or less, some degree of general agreement.

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Rest—Absolute and perfect rest in bed is essential. When there is much difficulty in breathing the propped up posture is of some relief. This should always be done properly by some strong support for the back and the leg should be kept bent at the knee, supported by means of a round pillow tied and fixed in position from the ends, thus preventing the patient from slipping down. Suitable dependable attendants should constantly look after the patient where trained nurses are not available. Turning the patient in the acute stage from side to side, even for examination may prove risky. "Twice I have witnessed oedema of the lungs precipitated by the act of turning the patient for purposes of examination"¹. Nothing emphasises the supreme importance of absolute rest better, than the lines quoted above. The bed should be not only comfortable to the patient but also easy of approach from the sides.

Undue disturbance—The patient should not be disturbed unnecessarily after the initial examination to find out the site, nature, and extent of the disease. Repeated examinations are exhausting to the patient, and serve very little useful purpose. Typical physical signs may not appear even in two to three days' time, but the site of pain, limited movement, local rigidity, impaired percussion note, deficient air entry and an occasional fine crepitus suggest the site and extent of the mischief.

As regards the details of the care of the mouth, teeth, tongue, skin etc., corresponding paragraphs under the treatment of typhoid fever should be consulted.

Ventilation Room etc—The room should be properly chosen and very well ventilated. Fresh air stimulates the heart and the respiration and supplies the requisite oxygen and relieves air hunger, promotes sleep, quietens restlessness, and improves digestion. When cool fresh air plays on the face and head of the patient, blood pressure improves and not uncommonly he feels refreshed. In our tropical country, these diseases may very advantageously be treated in open verandahs. Even in December nights one need not be afraid of cold and the doors and windows should be kept wide open. But cold draughts or glaring sun light should reasonably be guarded against. Visitors are undesirable.

In the matter of ventilation the unwilling public need to be educated and the fact that a person with high temperature cannot catch cold easily, should be impressed upon. Fortunately, rarely we ^{DO} _{DO} ^{have} _a ^{the} _{habit} ^{of} _{of} ^{being} _{being} ^{pernicious} _{pernicious} ^{habit} _{habit} ^{of} _{of} ^{not} _{not} ^{only} _{only} ^{closing} _{closing} ^{the} _{the} ^{doors} _{doors} ^{and} _{and} ^{carefully} _{carefully} ^{examined} _{examined} ^{It} _{It} ^{is} _{is} ^{only} _{only} ^{an} _{an} ^{unconscious} _{unconscious} ^{to} _{to} ⁻⁻ ₋₋ ^{being} _{being} ^{we} _{we} ^{can} _{can} ^{diagnose} _{diagnose} ^{unsuspected} _{unsuspected} cases of pneumonia.

1 Wynn (1932) Medical Annual 193² Pneumonia etc
 2 Norris and Farley (1925) Osler's Modern Medicine vol I Lobar Pneumonia p 186 Lea and Febiger publication

tice. The garment should be adequate but conveniently fastened for routine sponging and toilet of the patient. The peculiar morbid fear of cold often makes the fond parents overload children with thick warm clothing, which interferes with the free movement of the chest. This is to be discouraged, and reasonably warm clothing for the winter and pleasantly tolerated garment for the hot months should be advised.

Initial Chill or Rigor—During the stage of initial chill or rigor the patient should be covered with adequate covering of blankets or quilts. Hot water bottles well covered or electric baths where available may help during the distress. Hot drinks like tea, coffee, cocoa or hot lemonades may be of use. The chill is an inner sensation and is only got rid of, when the temperature has attained some height, thus preventing the involuntary contraction of the muscles during rigors. Once the fever is high one blanket and one sheet are often enough. Routine sponges with tepid water twice a day without disturbing the patient, should be done in all cases having temperature above 102.5°F.

Preliminary Purge, etc—Though there is difference of opinion as regards giving of the preliminary purge, yet clinically there is some justification in giving divided, say one fourth grain doses of hydrochloric acid, totalling upto one to two grains at quarter to half hourly interval, followed by some mild saline. In early cases this may be tried but in the later asthenic stages simple enema is the evacuant of choice. There are observers who are against any bowel movement being induced by purgatives.⁵ When seen late in the disease and there is distension or tympanites a simple glycerine enema of an ounce with equal amount of warm water, or a simple glycerine suppository may be all that is required to cause an evacuation. If the patient's condition permits, simple saline or soap water enema upto one point may be used with advantage. *Diarrhoea* in pneumonia is common and generally means intense toxæmia and appears to be another means of excretion of toxins. Unless very exhausting it need not be checked by bismuth, kaolin or Dover's powder.

Diet and Fluids—As pneumonia is as a rule a self limited disease food need not be thrust on the patient. But during the earlier part of the disease glucose drink containing four ounces of glucose to the pint of normal saline, and potassium citrate one dram added to it may be given with advantage. Lemon juice added to this drink improves taste and is often enjoyed by the patient. Aerated water, fruit juice, green coconut water where available, milk and its preparations may be allowed by turns. But the fluid intake should always be adequate to produce enough urine. To ensure this at least six to eight pints of

⁵ Wenn (1926) Treatment in general practice p 14 Lewis publication 1930

Rest—Absolute and perfect rest in bed is essential. When there is much difficulty in breathing the propped up posture is of some relief. This should always be done properly by some strong support for the back and the leg should be kept bent at the knee, supported by means of a round pillow tied and fixed in position from the ends, thus preventing the patient from slipping down. Suitable dependable attendants should constantly look after the patient where trained nurses are not available. Turning the patient in the acute stage from side to side, even for examination may prove risky. "Twice I have witnessed oedema of the lungs precipitated by the act of turning the patient for purposes of examination"¹. Nothing emphasises the supreme importance of absolute rest better, than the lines quoted above. The bed should be not only comfortable to the patient but also easy of approach from the sides.

Undue disturbance—The patient should not be disturbed unnecessarily after the initial examination to find out the site, nature, and extent of the disease. Repeated examinations are exhausting to the patient, and serve very little useful purpose. Typical physical signs may not appear even in two to three days' time, but the site of pain, limited movement, local rigidity, impaired percussion note, deficient air entry and an occasional fine crepitus suggest the site and extent of the mischief.

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In the matter of ventilation the unwilling public need to be educated and the fact that a person with high temperature cannot catch cold easily should be impressed upon. Fortunately, rarely we now find a pernicious habit of not only closing the doors and repeatedly and carefully examined. It is only by an unceasing vigil being we can diagnose unsuspected cases of pneumonia.

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one to two dram doses either in capsules or with extract glycyrrhiza liquid, syrup aurenti two drams each, in the evening, is of use. Two to three drams of paraldehyde in half an ounce of olive oil, high up rectally act as effective sedative. Fifteen grains to half a dram of bromide and ten grains of chloral hydrate with syrup may be also given orally in the early stages of the disease. Luminal and other barbiturates are depressant to the respiratory system, hence their use is dreaded by many.

According to Wilcox⁷ (1936) morphine atropine in small doses is quite suitable, specially during the early days. But again morphine is not a safe drug in pneumonia. But paraldehyde may succeed where morphine has failed in inducing rest. As sleep is the ideal from of rest hence it should be secured at all costs. Cool sponging, open air life, plenty of water to reduce toxæmia are also helpful to promote sleep.

Pain in the chest—The pain is usually due to involvement of the pleura and may be even agonising and so no stone should be left unturned to relieve it. Application of warmth locally is gratifying. Linseed poultice or cataplasma kaolini is of use. The old and time honoured linseed poultice retains heat for a long time and these should be applied only to the sides and the back of the chest but not over the front. "The weight of a poultice is not inconsiderable and the exertion of raising it forty times a minute is not one a seriously ill patient should undertake".⁵ The average way of applying the cataplasma kaolini or antiphlogistine, by tight bandages impeding the full respiratory excursions appears unsuitable for cases where free respiratory movement for proper oxygenation is life saving. Hot water bottles on the chest and sides may be soothing. In these cases brisk rub of the chest every few hours by a strong counter irritant containing one dram each of menthol camphor, liquor ammon fort, oil turpentine and gaultheria, in four ounces of mustard oil, preceded and followed by fomentation, may afford relief. For loss of sleep and pain one may give veramon and ortal each in two to three grains repeated at bed time. Impral calcium, dial, medicinal, are barbiturate derivatives and should not be given except during the initial stage. In very severe pain introduction of two to four hundred c.c.m. of air into the pleural cavity (artificial pneumothorax) is of relief. But this is only possible by experienced persons who have got the apparatus, and other facilities.

Distension of Abdomen—It is present more or less in every case. Careful and judicious dieting, good nursing, plenty of fluids orally to eliminate the toxins and cool or tepid sponging, may minimise it.

always due to the failure of the circulation. From the very beginning, therefore, the maintenance of the strength of the heart and of the tone of the peripheral vessels should receive our best attention and care⁸. Recently Perry⁹ (1934) supported by Ritchie has shown that circulatory failure in lobar pneumonia is really a failure of the circulation at the periphery. Warfield (1936) has noted that it is not the heart that fails in acute infections but the peripheral circulation collapses, so that the heart finally has no blood to pump, a condition, according to him, analogous to secondary shock. He notes "The heart usually becomes smaller in acute infections until just before death, when it dilates because of anæmia." Digitalis, according to this worker is not a useful drug in these cases of peripheral failure but measures to increase the blood volume such as intravenous saline of sufficient quantities, dextrose or Ringer's solution, or transfusions of blood are of service. Drug therapy upto the present time, as suggested by Warfield is limited to strychnine, pitressin and epinephrin and others. This worker emphasises that in acute infections, the heart does not fail, but the peripheral circulation does so. To combat these, fresh air specially when cool, cool sponging, mustard foot bath, saline transfusions, subcutaneous rectal, rarely intravenous, saline and glucose combined with injections of insulin, adequate external and internal hydrotherapy, good nursing, diet and so on, are of importance.

Digitalis Group—Recently the workers in the Bellevue hospital have shown that routine treatment of pneumonia by digitalis is not justified according to their statistics. The mortality in 338 patients treated with digitalis was 41.4 per cent as compared with 33.7 per cent in the control series of 404 cases.¹⁰

But more recently Cohn and Lewis¹⁰ (1935) in their detailed investigation into the value of digitalis in the treatment of pneumonia, find that administration of digitalis has little influence on mortality except when cardiac complications are present. The balance of evidence is that digitalis does no harm and may be slightly beneficial. They have also criticised the workers of the Bellevue hospital because they did not attempt to weigh the severity of the disease, and also that their figures are indeterminate and their condemnation of digitalis is based on a very scanty evidence.

The risk of production of fibrillation of the heart by digitalis according to Cohn and Lewis is very slight. Certainly digitalis is to be exhibited where there are indications. For dose

8 Moses (1932) N Y State Jour Med 32 p 863-864

9 Quart Jour Med 1931 3 p 273 April

10 Jour Amer Med Sci—1930—April 189 p 457

When typhinites is marked it demands similar lines of treatment as indicated in typhoid fever

Cough—For the ineffective hawking cough, tincture opii camphorata in twenty to sixty drops, with syrup tolu—two drams, may be given during the initial stages. Oxymel scilla, in thirty to sixty minims may be of use

A prescription like the following may be of benefit —

Syrup codeinæ Phosphatæ	in	60
Syrup Pruni Serotinæ	in	60
Syrup Tolu	ad m	240

one teaspoonful every four to six hours for irritating cough

Diamorphine hydrochloride	gr	½
Menthol	gr	1
Oil Abietis (Pine)	m	5
Tincture Aurenti	m	120
Rect Spirit	m	60
Syrup Tolu	ad fl oz	1

one teaspoonful every four to six hourly. For the less troublesome conditions, cloves or ginger—kept in the mouth and chewed gently when there is irritation, may relieve cough

But the salutary cough which develops later on and promotes expectoration is never to be stopped

Bleeding—This was practised in the olden days almost as a routine. But in cases where there is much enlargement of the right side of the heart, pulsating engorged neck veins, one is justified in withdrawing a few ounces of blood from one of the veins

Alkaline diuretic and diaphoretics—Plenty of fluids, as has already been emphasised, is often life saving. Besides glucose, and insulin injections for the heart, an alkaline expectorant mixture of the following type may be used with some effect

Sodium Bicarbonatis	gr	10
Ammon Chloride	gr	8
Liquor Ammon Acetatis	m	120
Spirit Ætheris Nitrosi	m	10
Syrup Scilla	m	60
Aqua Camphora	ad fl oz	1

one dose four times a day. The ammonium chloride acts as an effective expectorant

Circulatory disturbances—In the treatment of lobar pneumonia we do well to remember that when death occurs, it is nearly

always due to the failure of the circulation. From the very beginning, therefore, the maintenance of the strength of the heart and of the tone of the peripheral vessels should receive our best attention and care⁸. Recently Perry⁹ (1934) supported by Ritchie has shown that circulatory failure in lobar pneumonia is really a failure of the circulation at the periphery. Warfield (1936) has noted that it is not the heart that fails in acute infections, but the peripheral circulation collapses, so that the heart finally has no blood to pump, a condition, according to him analogous to secondary shock. He notes "The heart usually becomes smaller in acute infections until just before death, when it dilates because of anoxia." Digitalis, according to this worker is not a useful drug in these cases of peripheral failure, but measures to increase the blood volume such as intravenous saline of sufficient quantities, dextrose or Ringer's solution, or transfusions of blood are of service. Drug therapy upto the present time, as suggested by Warfield is limited to strichnine, pitressin and epinephrin and others. This worker emphasises that in acute infections the heart does not fail, but the peripheral circulation does so. To combat these, fresh air specially when cool cool sponging, mustard foot bath, saline transfusions, subcutaneous, rectal, rarely intravenous saline and glucose combined with injections of insulin adequate external and internal hydrotherapy, good nursing, diet and so on, are of importance.

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⁸ Moyer (1932) N.Y. State Jour. Med. 32 p. 863-864

⁹ Quart. Jour. Med. 1931 3 p. 273 April

¹⁰ Jour. Amer. Med. Soc.—1933—April 189 p. 457

direction and such like matters the chapter on heart failure may be consulted.

Early treatment—But it should clearly be laid down that the treatment of the cardio circulatory failure of pneumonia is mainly preventive and that with the first appearance of the least sign of any weakness or insufficiency of the circulation, prompt treatment of all the conditions affected, may do much, whereas late in the disease, the best of cares and treatment may prove quite ineffective. But interference should be done according to indications and not as a routine. Cases, need most individualisation here.

Routine Stimulant Treatment—This, without any indication, generally betrays a lack of judgment, as Norris (1925) (Osler's Modern Medicine, Vol I) has very ably said "On the other hand nothing can be more reprehensible than routine stimulation. A great nicety of judgment and one which can only be acquired by wide experience is required to decide just when and how much to stimulate. No absolute rules can be laid down but certainly it is better to err on the side of understimulation. The greatest benefit of the fresh air treatment lies in the fact that patients become less toxic, so that in the average case no stimulation is required. Specially this over stimulation is likely to be dangerous, when one realises that under the stress of this serious, toxic infection the human system is engaged in a grim fight, and to combat this all the defences are mobilised, here cautious and judicious therapy is the credit of the experienced medical man. But the debilitated or alcoholic or cancerous and such other subjects may require a stimulant line of treatment."

Some Drugs—Diffusible stimulants—like camphor in oil or ether in one c cm doses intramuscularly every four to eight hourly in weak subjects may be beneficial. Cardiazol—orally one tablet, crushed, every four hourly, or injections of 11 c cm of a ten per cent solution every four hourly may be tried. It acts both by muscular stimulation and by central action. But it is not much in use now a days.

Coramine and Veritol Coramine—in 17 c cm ampoules by subcutaneous injection, or orally two to five c cm doses every four to six hourly may be used. Veritol is useful as a stimulant both of the cardiac musculature as well as of peripheral circulation. These appear useful in pneumonia.

Ardenalin, Ephedrin and Pituitrin—better pitressin group are of use in peripheral circulatory failure. The first two may be combined in half a c cm and one fourth to half a grain doses respectively every six hours subcutaneously. But quickening effect on

the heart rate, by ephedrine group should be remembered. These when injected may give rise to unpleasant palpitation, in some susceptibles

Solucamphire—and its combinations are also of use. They are generally given in two or more c cm doses intramuscularly, but in urgent cases they may be given per vein, slowly well diluted with either glucose or saline.

Calcium Gluconate or Levulinate—Calcium levulinate has fifty per cent more of available calcium than in calcium gluconate. According to Zapel¹¹ (1934) calcium in pneumonia acts in the following way:

(1) It stimulates the sympathetic nervous system, (2) acts as an anti-inflammatory, (3) reduces the irritability of the cerebral cortex, (4) alters permeability of the tissue membranes favourably, (5) has a digitalis like action on the heart and circulation. Hence calcium and digitalis should not be given simultaneously in big doses, as their additive effect on the heart may promote cardiac asystole. Generally calcium is given in the form of gluconate in ten per cent solution five to ten c cm intramuscularly or per vein every twelve hours. When given properly diluted with glucose solution it is of greater use.

Glucose and Insulin—Recently some¹² workers have treated cases of pneumonia with injections of glucose and insulin, the dose of glucose being double in gram as per unit of insulin. Kharkov¹³ (1936) in his studies of insulin therapy in pneumonia of the aged, regards this infection as a state of non diabetic pathologic acidosis, running a course characterised by a pronounced toxæmia with a considerable increase in the blood sugar breaking down of albumin and fat with marked lowering of chloride metabolism. Archard was the first to refer to insulin as an alkalinizing agent and Kogen and Yasnyj were pioneers to apply it in the treatment of pneumonia. They treated one hundred and twenty-two cases of croupous and bronchial pneumonia by this plan without a fatality. Generally the average case requires five to twenty units of insulin every eight to twelve hourly with double the amount of glucose in grams. As for example, if fifty c cm of twenty five per cent containing 12.5 grams of glucose is administered then six units or even more say upto eight units of insulin may be given. These workers advocate even simple insulin therapy without glucose, as they found the blood sugar content of 0.120 to 0.160 per cent at the height of the fever in pneumonia. This method has given encouraging results in the present writer's hand. Glucose is best given

11 Duct Med Woch (Leipzig) 1934 Feb 7th 60 p 207

12 Jour Amer Med Assoc 1933 18th March p 708

13 Ibid 1937 January 2nd 108 p 81

in twenty five to fifty per cent solution intravenously, 12.5 per cent intramuscularly and five per cent rectally

Moisture or water or steam inhalation—In the dry months the death rate in pneumonia appears to be higher than that during the wet months. The moisture may well be supplied in the form of inhalation of tincture benzoin compound either through a steam inhaler or by any such suitable device. Where this is not available some water may be boiled in the room and tincture benzoin compound added to it.

Artificial Pneumothorax (in short called A.P.)

Behrend Roscoe, Cowper and others¹⁴ (1934) have come to the conclusion after treating cases of pneumonia by A.P.—‘That it is neither a cure all nor a *therapia magna sterilisans* but that it has shown itself a valuable adjunct in the treatment of pneumonia, even in some cases a life saving measure.’ Some times very “spectacular” results follow this method of treatment, prompt relief of pain and dyspnoea, being the most striking features.

Scott Pinchin and Morlock¹⁵ (1934) suggest that A.P. should be started within the first seventy two hours of pneumonia. “Of course the patient still has labor pneumonia and is acutely ill, but the relief of pain afforded by A.P. without resort to opium derivatives with their deleterious side effect changes the pathologic outlook of the case for physician and patient alike.” Leopold¹⁶ (1934) has given his experience of artificial pneumothorax in a male of forty four years suffering from unilateral labor pneumonia. On an average case about 400 c.c. of air is to be given and repeated daily or as the indications suggest. This treatment was tried in the Medical College hospitals Calcutta, with fair results. But this is not generally possible in private practice.

Optochin,—(ethyl hydrocupreine) in the form of a base in two to three grain doses after a cup of milk, thrice daily, has again been advocated by Reimann (1932)¹⁷ but Sawyer¹⁸ (1933) has noted amblyopia or retrobulbar neuritis following its use. This is not a safe drug to be used.

Quinine—Injections of quinine hydrochloride intramuscularly, in four grains every twelve hours, may be tried during the early acute period.

Transpulmin,—in elderly patients with pneumonia and bronchopneumonia intramuscular injections of transpulmin once or twice

14 Jour Amer Med Assoc 1934 June 9th 102 p 109

15 Practitioner 1934 October p 377

16 Amer Jour Med Sci 1934 March 187 p 315

17 Arch Int Med 1932 50 p 276-282

18 Jour Iowa Med Socty 1933 23 p 25-26

daily may be useful. This may be of use in all cases of chronic bronchitis with or without foul sputum.

Soliocin—It is an oily solution of quinine base with traces of volatile aromatic substances, like camphor and others, given intramuscularly, once or twice a day during the acute febrile stage, may be useful for the children, elderly and the debilitated.

Edwinil,—was once very much advocated and has not fulfilled the high expectations, specially when compared with its high cost.

S U P—36 (B D H),—is of use in these cases of respiratory or catarrhal infections. When given intramuscularly, early in the disease the course is said to be modified. I have found it useful in secondary broncho-pneumonia in children.

Colloidal Iodine per vein—Ten c cm of a 0.2 per cent colloidal iodine solution on the first, then 0.4 per cent, same quantity on the second then five c cm of 0.8 per cent solution on the third day, then daily or on alternate days may be of use.

Antemortem clot—How far this is a cause of death in cases of pneumonia is seriously doubted by many competent persons. To prevent this, plenty of fluids, citrates, citric acid in the form of lemon juice, alkalies etc., are indicated. Though calcium therapy, on the face of such a risk, is more or less contraindicated, yet clinically calcium injections afford undoubted good results.

Cyanosis etc—This is best combated by constant open air treatment. But wherever available oxygen should be given best by the tent method, though this is out of the question in this country as yet. It is said to be life saving. The old funnel method is worse than useless and though may produce some psychic effect on the patient and his relations, yet scientifically appears to have very little physical effect. It should be given through a medium bore catheter, say, No ten, pushed well back into the nasopharynx and at the rate of two litres per minute. According to Haldane in England and Barach in America, this is best given in the form of carboxygen,¹⁹ consisting ninety five per cent of oxygen and five per cent of carbon dioxide. This according^{*} to most workers is the ideal agent for all forms of defective oxygenation specially in pneumonia with tachypnoea, cyanosis etc. This inhalation of oxygen should be continuous, as according to Boothby (1932) intermittent oxygenation has no effect whatsoever. If the nasal catheter is irritating, which unfortunately is generally the case, and the semiconscious patient pulls it out due to its irritation, not only should the catheter be fixed on the cheek by a strip of adhesive plaster but also it is always preferable to smear the

For this purpose one to two¹ c.c.m. of a five per cent solution of sodium nucleinate given intramuscularly or subcutaneously every twelve hours may do some good. In very pronounced leukopenia pent nucleotide may be injected intramuscularly every twelve to twenty-four hours according to indication.

Specific Treatment — There are at present many difficulties in the way of a wide spread use of serum in general practice.¹ But this does not minimise the importance of this valuable specific line of treatment. Felton's concentrated anti pneumococcus serum is of use specially in infection by type one but is less so in by infection type two. These two types crust of about two third² of all cases of pneumonia. But as typical lobar pneumonia has been less common nowadays than a mixed infection of the bronchopneumonic type the use of serum is having a still restricted field of use. If the serum has got to be used economically then the type of infection should be determined first. This is not easy to be done for private patients even in hospital practice considerable delay often occurs in this procedure. Sputum may be absent during the early stages when serotherapy is of maximum efficiency. The cost is also not inconsiderable. As suggested by Wynn "It would seem wise therefore at present to restrict its employment in private practice for patients seen within the first three days who already have considerable toxæmia. To such cases twenty thousand units of polyvalent serum generally in ten c.c.m. should be administered at once intravenously warmed at body temperature suitably diluted with glucose. But before this the sensitiveness of the patient to foreign proteins should always be determined (see Serum Therapy). The sputum should then be typed and the homologous anti serum injected in twelve hours till upto maximum requirement of near about 80 000 units varying from 60 000 to 120 000 units in total particularly in accordance with the type and nature of infection is reached.

The exact position on this important serotherapeutic measure in pneumonia is summed up from the report of the investigators of the British Medical Research Council who worked on this question nearly for three years.³

Concentrated antiserum for type one reduced fatality in homogeneous group cases of lobar pneumonia in adults between the ages of twenty to forty years but appeared to have little, if any, effect on mortality in older patients. The treatment seemed to reduce definitely the average duration of fever and illness in patients who recovered and there was a suggestion that it also decreased the liability to empyema among survivors. Similar effects were seen when type two anti serum

¹ Lamb (1929) Edin. Med. Jour. 1929 Oct. p. 211

² Nature of pneumonia and its relation to the Immune Mechanism 1922

³ Lancet 1934 10th Feb. 1 p. 293

was used for cases of lobar pneumonia caused by homologous pneumococcus.

Dangerous immediate serum reactions were rarely seen in these three hundred and forty eight cases. On the whole, a good serum seemed to be devoid of disturbing effects on the patient.

Benefits—from serum are not so emphatic as to make it desirable that all severe cases of lobar pneumonia irrespective of type, should be treated with type one and type two anti serum on the chance that they might belong to a type which is favourably influenced. The special technic required for repeated intravenous injections and the cost make the treatment unsuitable for universal application. Use of serum is not recommended except under conditions in which typing of the pneumococcus may be possible.

As any suitable work on the typing of pneumococci is not done as yet on a large scale and as there is not yet any available data on serotherapy against pneumonia except a few cases treated on clinical grounds alone the position of this line of treatment is still very indeterminate in our country. Personally I have treated five cases with serum so far on clinical data alone without a single death. Marked toxæmia typical lobar affection quick pulse semi stuporous mental state prompted us to take resort to serotherapy in these cases. In most of these patients not more than three ten c cm bulbs at a time were given at twelve hourly intervals. In one case a young doctor of twenty five years 100,000 units of combined type one and two anti toxin were used with success. This patient which otherwise was likely to prove fatal as judged clinically the results of serum treatment was to my mind very efficacious. Almost similar efficacy was experienced in another very toxic case in the Medical College Hospitals Calcutta in a healthy adult of about thirty years of age. In both these persons the serum was administered within three days of the infection. The recent American idea on this subject is expressed in the report of a special Committee²⁴.

Losses—Wynn showed in 1932 in his series of cases that given sufficiently early vaccine therapy could even abort cases of pneumonia. It was authenticated by numerous charts given in Medical Annual 1932.

According to this worker²⁵ "Pneumonia is an acute medical emergency and the patient's fate is to a large extent decided during the first forty eight hours but too often a diagnosis is not made until consolidation is apparent which may not be for two or three days. During the preconsolidation stages when the circulation through the lung is not yet impeded and toxæmia is slight much can be done to control the infection by the timely use of a vaccine or serum. We

should think in terms of immunity. A patient recovers from pneumonia by producing sufficient immune bodies. It is not possible to pick out beforehand those who will succeed in this and twenty to thirty per cent fail entirely. By early specific treatment, a reduction of the mortality to five per cent is within the bounds of possibility."

Under the heading of specific treatment of pneumonia—Wynn remarks⁸: "When the patient is seen within the first three days a vaccine or serum should be given. A vaccine has the great advantage that it can be carried in the bag and is immediately available. It must be an active one of known antigenic power, made as far as possible from young primary cultures. The one I use contains equal numbers of pneumococci, streptococci and *Hemophilus influenzae* P S I vaccine. While it is desirable that it should consist of the various strains, it is more important that it should be made from virulent cultures. For an adult the dose is 200 millions of each organism—that is, 600 millions in all. Larger doses may be given at this stage, as the patient is not yet sensitized. Children should have proportionally smaller doses but even at twelve months 20 millions of each organism should be given. The object is to stimulate the production of non specific antibodies in adequate amount. The specific effect is not seen for some days. If the temperature does not fall by the first injection it can be repeated every twenty four hours until three doses have been administered. When such doses are injected on the first day of the illness, in the majority of the cases the temperature falls rapidly during the next twenty four hours with a corresponding improvement in the general condition. With each day's delay, such rapid defervescence is less easily obtained. When cases are not treated until after the third day the circulation through the infected part is interrupted and toxins are fixed in vital tissues little can be expected of specific treatment, whose aim is to prevent, not cure toxic symptoms."

The above paragraph is explicit enough not to require any explanation.

Irvin⁹ (1917) reported treatment of cases of pneumonia by injections of stock vaccine given early. He supports the work of Wynn. I am trying to treat cases in these lines but the difficulty lies in the fact that generally we see cases after the third day and they are not so suitable for vaccine treatment. But even on the third day, the result of vaccine treatment appears not unencouraging.

Treatment of Complications—

Delayed Resolution—Treatment should be directed to improve the general health and nutrition of the patient. A liberal supply of fresh air, is of distinct service. Locally counter irritants ruled on

For diagnosis the presence of one or more of the following are of help—

(1) **Hæmoptysis**, generally profuse but usually of more than one drain is commonly said to be present in about sixty per cent of all cases (Osler, 1925).³ But authorities differ in their figures varying between twenty four to eighty per cent depending besides on other factors, on the stage of disease, the age and sex of the patient, and the time spent under observation etc.

(2) **Pleurisy with effusion**.—A large proportion about sixty six³ per cent in a series of cases of pleurisy with effusion turned out to be tuberculous as diagnosed by our modern methods including the x-ray findings. That all such cases are due to tuberculosis appears too sweeping a statement.

(3) **Persistent moderately coarse crepitant rales** (Burrell 1936)⁴ above the third rib or the third vertebral spine present even after coughing were found in forty two per cent of a series of cases analysed by Fellows (1931).⁵

(4) **Röntgenological findings** of a proper and positive type. In Fellows series of one hundred and forty-one cases of healthy applicants for life insurance, the x-ray examination of the lungs showed about sixty five per cent in the minimal stage and about thirty per cent in the moderately advanced and five per cent in the advanced stage of pulmonary tuberculous infection. Recently tomography⁶ has been solving the problem of localisation of cavities and others. In this connection the following remarks by Burrell⁴ are noteworthy physical signs are notoriously misleading in the diagnosis of tuberculosis of the lung and it is possible for advanced disease to exist without any physical signs being detected even after careful examination by experienced physicians.

Kattentadt (1929)⁷ of Munich has emphasized the importance of scrutinizing the suspicious cases by fluoroscopy. Taylor (1931)⁸ stresses the importance of x-ray examination of the lung for the determination of the type of tuberculosis—either exudative or productive and so on.

(5) **The presence of tubercle bacilli in the sputum**. Failure to examine the sputum is inexcusable. One has personally seen great confusion in the diagnosis and consequently in the treatment of a case for the neglect of this simple but very important test. This is a very positive and diagnostic finding.

Due to its protean manifestations some diseases are mistaken for it and, what is more important for the patient, that pulmonary tuberculosis has been mistaken for other diseases. So in the diagnosis one should try to think of the diseases which simulate may simulate pulmonary tuberculosis.

TREATMENT

Prophylaxis—This resolves mainly into two broad factors—namely (1) destruction of the specific germ and (2) increase in the resistance of the individual.

CHAPTER IX

PULMONARY TUBERCULOSIS .

Diagnosis.—In its variety of manifestations pulmonary tuberculosis stands unique. The earlier the disease the more difficult is the diagnosis. But there are other difficulties too specially for the young practitioner and the student. In practice, what we do not look for in the patient is not generally encountered. The use of the extreme frequency of pulmonary tuberculosis, every physician should expect to see it in all cases with a reasonably suspicious history.

The history of frequent colds, persistent unexplained cough and expectoration, loss of strength and weight, vague indifferent health or failure to regain strength or nervous breakdown after influenza or colds, specially when these symptoms are felt more aggravated in the evening, digestive disturbances not explainable by ordinary means, slight shortness of breath pain in the chest, blood spits, feverishness, tachycardia, pleurisy, etc. should arouse suspicion specially if there is a history of exposure to tuberculous infection either in the family or anywhere else. A tuberculous family history is a helpful additional point which should receive only its proper share of not undue importance. But in our actual practice generally the patient seldom spontaneously gives out more than one or two symptoms even when there are others to be elicited by the doctor by leading questions. It appears that in the diagnosis of early pulmonary tuberculosis not only leading questions but all other devices to get a complete list of complaints in addition to the proper history are of service. Besides the history and complaints of the patient the important requisites for a proper diagnosis are—careful observation of the patient with record of pulse rate, temperature taken orally four hourly, especially in the afternoon and at night with a record of weight, characteristic or suspicious physical findings, roentgenogram of the lungs, tuberculin test and others. In all reasonably suspicious cases the patient should be kept under observation and examined repeatedly until tuberculosis of the lung has in all probability, been eliminated. Amenorrhoea in young women may mean generally pregnancy or tuberculosis of the lungs.¹

The first indications are usually in symptoms than in signs and are extremely diverse and may relate to any organ of the human system, hence the difficulties of diagnosis are great specially at the very early stages.

Pottenger has stress upon motor and sensory symptoms which are caused reflexly by the inflammation of the lungs.

Early pulmonary tuberculosis depends in the great majority of cases, on probabilities rather than on certainties as the signs and symptoms may be indefinite and not always invariable even in health.

The undue stress laid upon the occurrence of slight symptoms and of slight departure from normal health and upon equally abnormal physical findings has been a source of confusion to the young practitioner.

1 Dhar, (1937) Ind Med Gaz July 1937 72 7 p 409

2 Marshall, (1937) Brit Med Jour 4th Dec 1937 p 1103

the chest may be useful Camphorated oil is suitable too A mixture like the following one may do some good

Syrup Ferri Iodide	m	60
Calcium gluconate	gr	10
Sodii Salicylatis (wt)	gr	5
Sodii Bicarb	gr	10
Syrup Tolu	m	60
Aqua Chloroformi	ad fl oz	1

one dose thrice daily

In the absence of a good leukocytosis, five per cent iodine solution one to two c cm, intramuscularly or subcutaneously daily or on alternate days is of service Liver extract in two to five c cm doses injected into the muscles may do good A suitable anti enteric vaccine may be also tried with efficacy One has used intra venous injections of both one to two c cm of iodine solution and ten per cent five c cm of calcium gluconate solution, alternately with some effect Ultra violet rays may help to build up resistance of the patient Tonics, vitaminous diet eggs milk, butter and fruits should be added

Prophylaxis —The predisposing factors like bad and unhygienic diet specially with prolonged lack of vitamins, bad sanitation want of out door exercise overwork worry getting soaked in rains or getting chilled, and so on should be avoided and remedied wherever possible In the hospital of the Rockefeller institute, America all cases of pneumonia have been treated in individual rooms all nurses and doctors attending them wear gowns and masks and so on²⁶ Isolation of the patient and prophylactic inoculation may be of use

Convalescence —This depends on the nature of the case, its gravity supervention of any complication or not, presence of these meaning a cautious watchful care over this period Reversion to work should be gradual and gradual If there are any of the residual signs and symptoms a change to a more bracing climate a good vitaminous diet rich in fats proteins and fruits may be of value Iron arsenic strichnine malt extracts, milk, egg, butter, fruit juices, green vegetables, go a great deal to build up the lost resistance and general health of the patient

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TREATMENT

Prophylaxis — This resolves mainly into two broad factors—namely (1) destruction of the specific germ and (2) increase in the resistance of the individual.

³ Osler's Modern Medicine Vol I Brown (1925) Tuberculosis p 410
Lev Febiger publication

⁴ Burrell (1936) Med Annual 1935 p 478

⁵ Fellows (1931) Amer Journ Med Sci 88 p 533

⁶ McDougall (1937) Tubercle 19 p 50

⁷ Kattentadt (1929) Zeitschr Tuberkose 55 p 193

⁸ Taylor, (1935) Journ Amer Med Assoc 101 p 898

The specific organisms which are very resistant to ordinary means of disinfection are as a rule derived from patients who are suffering from this disease, specially of the lungs. While a person with open lesions in the lung coughs, he sprays fine particles of tubercle bacilli sputum at a distance of about a metre. The utensils, floor, bed and as a matter of fact almost everything coming in contact with the patient are likely to be infected, hence the great importance of complete isolation. This is again a disease in which if young people are continuously exposed are almost sure to be affected. Though there are numerous methods of checking this ever increasing menace, still the following few may possibly be suggested—(1) local study of the prevalence and spread of this disease, (2) a list of resources that can be used to control it, (3) notification of cases to facilitate segregation, education, cleansing and renovation, (4) provision for dispensary facilities of early diagnosis and thus to check the spread of infection to others (5) provision for adequate number of hospital beds and sanatoria (6) though pre-eminently an economic question, suitable protection and strengthening of all those directly exposed to the disease (7) to enlist as much of public support as possible (8) educating the public on the importance of early diagnosis, segregation etc. To be of any appreciably effective type—the propaganda must be a national one, beginning from the children at schools onwards.

It is mainly a house disease. And as such the need for precautionary measure, against over crowding and lack of ventilation and so on, should always be emphasised. The disinfection of the sputum, is best done by burning it in fire or by boiling it (sputum) for thirty minutes with suitable disinfectants.

Rules to be followed by the patient—The patient should always hold a cloth and not the palm, in front of the mouth while coughing or sneezing and so on. This cloth should not be used as a handkerchief but burnt down. He should be cleanly in his habits and fully alive to his duty to the public. Until this is realised, little effective prophylaxis can be accomplished. Beards and moustaches should be short, if kept at all. Kissing should be forbidden. The hands should be frequently washed and he should not touch any food intended for others. The space between the beds should be more than four to six feet. Due care need be taken for the utensils and other articles which may be smeared with tubercle bacilli, especially in an open case. The floor should be only wet cleansed by swabs soaked in five per cent carbolic lotion and never dry sweeping allowed. The furniture and extra articles should, as far as possible, be taken away from the patients room. The sputum should be dealt with properly as suggested. It is not always safe to bury the sputum as it may percolate and find its way into sources of drinking water.

Individual Prophylaxis—This really begins from the childhood, specially in weaker children. If a child is born of tuberculous mother, the latter should not nurse the child. Contact with the mother should be as scarce as possible. The child should be separated from the mother and all precautions to prevent infection adopted. The floor if used for the child's bed should be washable and daily cleansed carefully with antiseptic and by wet mops. The street shoes should not be allowed into the nursery. The child should never be allowed inside the room of a consumptive except for a moment. Infancy is the period of greatest susceptibility and contact with infective cases, harmless to older children and adults, may bring about an acute fatal form of disease. Hence strenuous efforts should be made to protect children under three years of age, the period of greatest susceptibility.

Gradually from the age of two to five years, the child should be given cool sponges, and allowed to sleep in a room having its doors and windows opened up, specially in the tropics. In the cooler countries and places, suitably cool but a well ventilated room should be his place of sleep at night. The hours spent out of doors should be lengthened in winter and as much as possible in the summer. He should be initiated to self restraint and unselfish habits. These rules are important for susceptible children. They should preferably be brought up either in good country towns or in healthy suburbs. If during the school going age the child is not as strong as it should be as compared to his age, he should frequently be examined for the possible disease and his lung, tonsils, teeth, digestion and diet attended to. Inspite of all these it is doubtful how far we can protect these children. They should always be protected from all infectious diseases including measles, whooping cough, influenza and others. These by lowering body resistance may flare up a dormant tuberculous infection. Gradually as he grows, the boy should be encouraged to participate in out door sports, but never allowed to undertake these to the extent of over exertion. Bad eaters require special care and attention, and any susceptible or exposed person who is in young age ten pounds or more below the optimum weight should be specially looked after in view of pulmonary tuberculosis.

During adolescence⁹ the stress of more studies, increased physical strain and the worries of work for the poorer classes, mark out this period as important. All excesses, night keeping, irregular meals, and anything which tends to lower the body resistance should be avoided at all costs, because it is during this age that most of the latent or preinfective cases turn into frank tuberculous subjects. Women of child bearing age are more susceptible than elderly ladies¹⁰.

⁹ Wingfield and Macpherson (1936) Brit Med Jour 1, p 711

¹⁰ Durrell, (1936) Jour of state Med 44 p 7

Change to better climates sea voyage and mountain climates are suitable during adolescence Then comes the choice of profession, the question of marriage, and so on These need serious but judicious consideration But to be able to undertake all these measures, there needs the ever important basis of economic affluence

CURATIVE TREATMENT—

Curability —Probably in no other chronic disease, as in pulmonary tuberculosis, success depends upon the skill and ability of the physician to regulate the life of the patient and thereby raise his body resistance, as it is on the latter that we have to depend for the ultimate cure of this long continued disease For this the following points need emphasis

- (1) The great amenability of pulmonary tuberculosis to treatment specially at its earlier stages hence the importance of an early diagnosis and prompt treatment (2) Though the disease manifests itself locally in the lungs, yet it gains a foot hold first by lowering the systemic resistance hence the importance of increasing the resistance by all possible means (3) Patients need more careful individualising in this disease according to their economic, mental, physical environmental occupational and other states than in any other disorder (4) In most of these cases before actually beginning treatment it is wise to explain to the patient, and if required to his guardian, the persistent nature of the disorder and of the indispensable necessity of earnest co-operation of the affected individual A person who is clever, persevering with a determination to get cured, is far more likely to be all right than a dull, apathetic or fussy or careless person, who by nature being without a stamina is likely not to follow the tedious regime so long as he feels strong inspite of illness Hence the nature of the patient is also an important factor in determining whether cure will be easy or difficult in a particular case The pecuniary condition of the patient is none the less important, specially for home treatment

Even after arrest of the disease the patient must stick to the dieto hygienic regime and a regulated life which led to the arrest of the pathological process Though it is extremely difficult to give any idea as to the length of time required for the arrest of a particular case of pulmonary tuberculosis yet generally it is not possible to get any appreciable results before two to six months, and it must be realised that the stage of the disease and the resistance of the individual are important guiding factors which determine this time limit But unfortunately this is often too long a period to tire out the patience and even endurance of many, hence comes the difficulty in treating

this protracted illness. There may be persons of certain families with inherent lowered tissue resistance to infection by mycobacterium tuberculosis. Infection in such subjects has naturally a gloomy prognosis. The scheme of treatment consists in *rest*, first and foremost. The autopsy results by workers in central Europe show that about ninety seven per cent of human beings dead of other diseases show healed tuberculous lesions in the apices of the lungs. This means that nature helps the healing of tubercles by increasing body resistance without the assistance of doctors. It is, besides other factors, the violation of the natural laws of hygiene, sanitation and also of the principles of physiology that conduces to this infection by lowering resistance. Before actually starting treatment all the physical defects in the teeth, tonsils and sinuses, nose, digestive tract, and so on should be corrected.

Rest should be absolute in all cases showing any temperature and increased pulse rate. It may be required that this period of absolute typhoid rest should extend even upto several months. As the temperature tends to be normal notably in the evening the patient should be allowed gradually to sit up first for a few minutes to be prolonged according to its effect on the temperature, pulse and so on. Gradually standing (erect posture) is allowed and gentle walking of a few steps and so on. The type duration and speed of these exercises should be regulated by the nature of the response the system makes as manifested mainly in the raised temperature or increased pulse rate and so on. If these indicate that too much of exercise is being taken then more rest and less of exertion is to be advised. In short this graduated exercise should be just short of a febrile reaction and persistent increases of pulse rate. The main idea underlying is, to immunise the patient to the tuberculin liberated from his foci of infection gradually and slowly so that at least he may undertake his usual avocation without a febrile reaction and loss of weight. Thus in time the patient may be allowed to go out on a cautious drive. Ultimately graduated work without causing a temperature and acceleration of pulse rate and loss of weight may make him fit to carry on his occupation. Once he is immunised to his own tuberculin and there is decreased pulse rate, the weight of the body increases and the diseased process gets arrested. Needless to say that the less strenuous the occupation is the better is his chance of remaining well.

Fresh air and open, outdoor life—Fresh air has long been regarded as an essential part of the treatment of pulmonary tuberculosis. Persons having outdoor occupation of a healthy type, are generally found to be robust and it is also known that fresh air tends to make a man healthy and his general systemic resistance

improves,¹¹ and the susceptibility to cold and catarrhal infections decreases too. This scientific truth is utilised to bring about a cure of the tuberculous subjects. But here too moderation, caution and judgment should guide us. According to Philip (1931)¹² "this is the foundation on which all other procedures should rest. In proportion as this is sufficient, everything else becomes easier." The patient should be given as much of fresh air as possible, consistent with his general health and state of disease. Philip, in his rather enthusiastic words says "experience prolonged through many years in the treatment of very many patients in all stages of the disease thoroughly justifies the statement that the fullest exposure of the tuberculous patients to such influence is free from risk and followed by striking benefit in almost every case."

This according to him 'applies both to pyretic and to aipyretic cases, and none the less to patients with bronchitic and pleuritic disturbance. It is a mistake, in presence of increased pyrexia or signs of bronchitis, or pleurisy to limit the exposure to air and light. Nor must it be lessened by reason of changeable weather. It is equally safe, if perhaps less certainly serviceable and pleasant during rains mist etc.'

Whereas according to Burrell¹³ (1936) it is wrong to have widely opened windows and through draughts in all weathers, fog, wind rain or snow etc.

But one should always exercise common sense and see that chilling is avoided. Suitably sheltered open spaces—say under the shade of trees or protected verandahs are quite suitable for most cases specially when the weather is fair. House tops are very good all the year round if arrangement is made for protection against inclement weather. The patient should be lying in a bed if febrile all the while gradually as the fever becomes less he may be allowed to sit on a camp chair, reclined for a few minutes to be prolonged gradually. At night sleeping under a proper shelter with no blockage or very little blockage to free flow of fresh air is quite suitable. When the patient cannot but be inside the room, all the doors and windows should be kept open day and night. In the mud built thatched cottages of the poorer people, the verandah may be utilised for this purpose, with temporary protections devised for the rains. During the winter months except where the cold is very freezing at night the patient may be made to get used to lie in the verandah day and night. Cold or hot blasts of wind may be prevented from reaching the patient by

11 Morland (1936) Brit Jour Tuberc 30 p 142

12 Philip (1931) Index of treatment by various writers Ed ted by Hutchinson p 727 10th Edition Wright Bristol

13 Burrell (1936) Ibid p 21 11th Edition—January 1936

proper clothing or barriers or protection. But the average room in the mud built house or the rooms of brick built houses of middle class people, are not generally suitable for fresh air treatment, a very important adjunct in the cure of this protracted scourge.

Diet and infection—Thin persons are more likely to contract tuberculosis than stouter ones. When there is shortage of food generally the incidence of tuberculosis increases; this was very strikingly demonstrated during the last Great war. Specially shortage of animal fat in the diet tends to predispose to tuberculous infection. Weak digestive power and not uncommonly loss of appetite are common in tuberculosis, but generally, when instead of the indoor life the patient is given an open fresh air regime very ably expressed in the analogy¹²—as soon as they are planted from the hot house of indoor treatment to the open garden of free air and light, the appetite returns more or less quickly and there is an appreciable improvement in digestion and assimilation. To increase appetite the alkaline bitter mixture given an hour before the principal meals followed by hydrochloric acid and pepsin as in cases of dyspepsia, may be of definite service.

Diet—should be nutritious and at the same time easily digestible the cooking good and the service attractive. Serving the meals in the open air is often an agreeable change.

Breakfast—Consisting of oatmeal porridge or fried rice or paddy—(Muri or Khoi or Chipitok with milk butter sweetened with molasses—instead of sugar two eggs some buttered bread or butter and sugar candy in the absence of loaf or chapati some fresh fruits, whatever available even tomatoes are of use. Vitamin C not only keeps the tone and nutrition of the endothelium of the blood vessels but it also helps in the regeneration of new fine capillaries thus helping quick cure of lesions.

Butter one to two ounces or one fourth to half a chittack, one glass of milk two eggs some fruit or fruit juice milk banana and rice boiled or fried or oatmeal porridge with sugar, are suitable for those who can afford. For the comparatively poorer people some germinating grams with ginger a cup of milk one egg or milk and fried paddy or rice chipitok or khoi or muri with banana and molasses are suitable. If the patient cannot afford fruit, tomatoes, three to four of the average size ones may take the juice of fruits. Some suitably grown green vegetables such as "Palon Shak".

Lettuce or the soft central portion of cabbages may be taken raw, with tomatoes sliced having small amount of sugar and salt added to taste. Some add small amount of juice of a lemon to this salad, to which raw onions may be sliced and added is liked by many. Such salads in a mable should be taken either with the lunch or two hours

after the breakfast of milk and eggs. The salad might, due to its acid content, interfere with the absorption of calcium hence the suggestion of taking it separately from milk, eggs etc.

'Papita', (*Pipasa*) 'beal', mangoes, apples, bananas, oranges, custard apples, berries, tomatoes, cucumber, germinating grams, all or separately, in small portions, salads should always be partaken of, during the day time. Taken at night they may give rise to abdominal discomfort. Unless the salad is properly made after thorough washing of the vegetables there may be a risk of infection of the intestinal tracts by typhoid group of organisms.

Noon meal or Luncheon The noon meal may consist of all proximate principles of diet, provided it is nutritious and easily assimilable. For those who like and can afford—a soup with some butter or suitable animal fat floated on it specially during the winter, bread and butter, or rice, not overmilled hot, with as much butter as the patient can digest and afford, or 'chapati' or 'puri' made of dependable whole meal, the former being smeared with ghee or clarified butter, some lentil (dal) cooked with butter, vegetables, fish, meat, egg, prepared according to the taste, appetite and digestive power of the individual, are of use. For the vegetarian suitable dishes may be prepared. Milk preparations with sweet like *sandesh* or *poromanno*, custard etc of similar preparations are liked by many. The fresh leafy vegetables are important sources of mineral salts and if properly digested have the efficacy almost equalling that of milk. The *afternoon tea* should consist of almost the same items as chosen for breakfast, but variety, taste and liking of the patient should always have due consideration.

The Night meal or Dinner This should better be taken by seven to eight in the evening, consisting of almost the same constituents as partaken of in the noon meal, but here again some milk preparation, egg, butter and sweets are included in the dietary with advantage. But very heavy dinners specially when taken late, are not quite suitable for patients with weak constitution. The scale of diet should be built up gradually and by steps otherwise there is risk of causing digestive trouble.

The diet should not only be rich in mineral matters and vitamins but also should contain all the proximate principles, preferably in something like the following proportion, proteins—90 g., fat 160 g., carbohydrate 220 to 250 g.

In all these cases, where the digestive capacity permits, *extra ration* in the form of a cup of sweetened milk, in between the principal meals should be insisted and that generally to the advantage of the patient. Gradually the quantity is to be increased specially of milk, eggs, butter, fruits etc.

In short—one should stress on the intake of two to four eggs, one to two seers or two to four pounds of milk, butter one to two ounces, or one fourth to half a chittak and some fresh fruits, meat and fish with carbohydrates, green vegetables etc, daily. Cheese and cream are important articles of diet for these cases, and should be given wherever possible.

Extra diet—Addition of good cod liver oil to the ordinary diet, or along with milk, beginning from one to two teaspoonfuls, twice daily, stirred up in the cup of milk, increased upto four to eight teaspoonfuls may be of good service. As most persons suffering from tuberculosis are thin and require fattening, this course of easily digestible fat rich in A and D vitamin is a valuable addition to the dietary.

Most subjects of tuberculous infection find pure milk unsuitable, and often it produces gas and abdominal discomfort. In such cases if milk is boiled with any cereal as barley or sago or rice or flour, and given to the patient, this discomfort is generally overcome. Even when milk is condensed to a thicker consistency, strangely it also agrees with most of the patients. These practical points are worth remembering. When milk produces diarrhoea or loose stools soured milk (dahi) or curd (channa) may take its place. Cheese and cream are valuable additions in the list of ordinary dietary.

Those who are used to alcohol, may be allowed to take it in great moderation after meals but personally one is against its use in this as in most other diseases.

Vitamins—Plenty of A and D vitamin is found to be of service, the former for its anti infective and the latter for its blood calcium and phosphorous balancing properties, besides their other usefulness. Codliver oil may not be assimilated by patients with weak digestive power. In these cases some form of halibut liver oil or other preparations of vitamin concentrate such as haliverol, adexolin, vitidex, navitol etc are useful. Plenty of C vitamin appears to be of use too. Malt combination with these vitamins and iron are valuable in the treatment of all chronic wasting diseases, best examples are ferradol, irradio-malt etc. They sometimes help in rapid regaining of body weight.

Calcium—Workers in lime are generally free from tuberculosis. Though there is not much scientific basis for its use except that we do find at times some effect on the range of the temperature of the tuberculous patient after injections of calcium, yet it is used extensively. According to Mac Callum¹⁴ (1924) "Serum contains calcium

and inorganic phosphorous in solution in much higher concentration than would be possible in water on account of the high carbon dioxide tension and the contained proteins. This is true in intercellular fluids where the carbon dioxide tension is high on account of cellular activity. When the carbon dioxide tension is low because the tissue is inactive or dead, conditions are favourable for precipitation." Hence may it be very unlikely, that calcium, when in excess in the blood, gets precipitated round the dead necrosed or dying tubercles, where the lowered or absent cellular activity favours calcification around them. However, this is how nature isolates and walls up the diseased foci of tuberculous lesion. Calcium may be exhibited in the form of injections of *gluconate*, intramuscularly or per vein. Generally the ten per cent solution beginning from two c cm upto ten c cm twice a week is advocated. *Calcium chloride* is given in above dosage and interval but generally is started initially from five per cent worked upto ten per cent. It is to be given only intravenously as intramuscular injections of calcium chloride cause extensive necrosis. Even while giving intravenously if one drop leaks into the subcutaneous tissues, necrotic ulcer is almost sure to follow, hence it is now more or less in disuse. Intravenous calcium injections should be given very slowly and if ten c cm is to be given, after each three or four c cm is injected, the feeling of warmth that the patient experiences in the throat and over the body, should preferably be allowed to pass off, till the next few c cm is pushed into the vein. D vitamin^{15 16} with parathyroid in 1/10 to 1/4 grain doses with calcium given orally, is likely to raise the calcium level of blood. There are several such preparations in the market. Some prefer to inject colloid calcium with vitamin D in one to two c cm doses twice or thrice a week. Only the dependable preparations are safe to be used for this purpose. Calcium, pancreatin, lactopeptin and takadiastase in five to eight grain doses each, with cryogenin in two to four grains in febrile cases, thrice daily after meals, may be used with good effect.

Iodine—Nascent iodine was in vogue for some time, but it appears to be of doubtful value. Intravenous iodine in small doses may be of some use in cases with bronchiectasis or chronic bronchitis, but for the latter type of cases calcium iodide in three to five grains with other suitable remedies may be tried.

Creosote and its derivatives—Pure beechwood creosote, given in one to five minimis in capsules or in emulsion is advocated by many. But it upsets the digestion and is often contraindicated. Thiocol (potassium guaiacol sulphonate) in four to ten grains thrice daily may be used with advantages of creosote, but without its disadvantage.

15 Hunter and Lub (1927) Quart Jour Med 20 p 123

16 Gordon Roark and Lewis, (1926) Jour Amer Med Assoc 86 p 1683

These preparations appear not so much in use nowadays as was in former days. They are indicated in chronic disease with bronchitis or bronchiectasis with foul smelling sputum etc.

Arsenic—According to old French workers, arsenic is a valuable remedy in tuberculosis of the lungs. It may be given in three to six minims of liquor arsenicalis twice daily after food, or injections of sodium cacodylate in half to three fourths of a grain subcutaneously, daily, till ten to fourteen such are given. This is again repeated after three weeks. The liquor arsenicalis should be continued for at least two to three months. It is a valuable alterative and increases tissue resistance to all chronic infections.

Shock Therapy (Burrell 1936) This consists of producing a reaction by the intravenous injection of T A B or some other foreign protein. If a patient has a persistent temperature and is steadily losing ground improvement may follow reactions produced in this way. The treatment should, however, be tried with caution and very small doses given at first, as the shock, specially if severe, may aggravate the tuberculous lesion.

Sanatoria These are generally located in specially selected places, where subjects of tuberculosis are likely to be benefited. The patients have the advantage of being under the careful supervision of doctors with much experience in the line. The strictly regulated life in these institutions helps in the building up of quick defence. The bracing climatic conditions in which these sanatoria are situated help by increasing appetite and better assimilation, and thus quickly builds up resistance.

But the modern tendency is not to stress so much on the nature of the country and its climatic conditions, because, we are gradually learning that much might be done in all average places provided the conditions permit abundance of fresh air, and observance of the common items of physiological principles. It would be rash and foolish to deny the salutary influence of good climate on a case of pulmonary tuberculosis. But for an average person, this means expenses not uncommonly beyond his means. If the financial strain is too much for him to bear, through anxiety and mental strain improvement is not likely to be as satisfactory as was expected. When a case is sent to a sanatorium, the first question should be,—is he fit to undergo that strain of the journey? Would he be able to stand the change in climatic condition? Pyrexial cases while being sent need special consideration. Late or too advanced cases are not likely to be benefited much by a change to a sanatorium.

When the patient improves, graduated exercise is given to him so that when he reverts to normal life, he can carry on his usual avocation without difficulty. But unfortunately one has seen cases, who have become febrile after they have reverted to their normal

life. A course of tuberculin injections to abolish this sensitivity or the state of allergy, previous to the patient's resumption of work, is advised with reasons, notably to prevent a breakdown.

Selection of climate—According to many including Burrell "tuberculosis is a disease of all countries and climate plays but a small part in its treatment". In choosing a sanatorium the condition of the patient as a whole is of greater importance than the disease. But the state of illness also need consideration, in selecting place for the change.

Sea side These places are suitable for persons with a weak circulation, or having chronic bronchitis, asthma, or a tendency towards catarrh or albuminuria. Particularly suitable cases are those of glandular, joint and bone lesions caused by tuberculous infection.

Sea voyage,—has all the advantages of a seaside climate, with the additional benefit of a pure fresh air and sun light. But one should spend the minimum time in the cabins.

Mountain climates Generally climate with high altitude is utilised for sanatoria. The advantages are, great purity, dryness, coolness, brilliance and warmth of the sun's rays with quiet and stillness of the atmosphere. These all make great impression on the patient's mind and the body. Though variable in effect it stimulates not only circulation and respiration but also helps in the regeneration of blood, improves appetite and digestion, promotes healthy secretory activity of the skin and so on.

These places are suitable for all types of cases except those having tendencies to chronic bronchitis, asthma, enteritis, albuminuria, etc. Cases should better be sent to these higher altitudes while they are in the acute exacerbations. Availability of good and abundant food is an important factor in choosing these places out.

Forest and Woodlands These places with relatively slight or no elevation are suitable for most types of cases. Even progressive ones derive some, often much benefit, therefrom.

But it need be remembered that though these places possess certain peculiar advantages by their stimulating action on the various systems of the human body, yet the most important items of treatment, namely abundance of pure fresh air, with an active sun, plenty of good food, proper rest and graduated exercise, according to indication, are the principal factors in bringing about a cure.

Tuberculin It is a very extensively tried remedy which gave varying results in the hands of different individuals. Some of the important causes of lack of success may be traced to—

(1) Improper selection of cases

(2) Want of patience on the part of the affected and lack of experience of the doctor.

(3) Sometimes, the hasty and reckless methods of employment of this highly delicate remedy and several other minor factors

But the recent idea is, that tuberculin has a limited field in the treatment of tuberculosis

Indication etc. It generally aims at causing tolerance or desensitisation, and not exactly, at immunity. The reactions after injection, as in vaccine, are local, focal and general. In short the proper cases are those in whom the disease is localised and the systemic disturbances slight. To be of any benefit the defence mechanism of the patient must be capable of a response, hence in cases where the disease is already systemic with more or less marked toxæmia, tuberculin treatment is contra indicated. Patients rendered afebrile, after a judicious dieto-hygienic regime are generally suitable for tuberculin treatment, and it may help to reduce chronicity. It may also be used in early closed cases or in apparently healthy but suspected persons in tuberculous families, to raise their tolerance to the toxins. Children do well under it too. In former days and in places where artificial pneumothorax treatment is not possible, but sufficient rest does not render them completely afebrile tuberculin may be tried but should be started from very minute doses. It is probably unwise to administer tuberculin in cases whose minimum temperature does come down at the height of the febrile bout to 99°F or below.

Frank contraindications are,— rapid loss of flesh, malnutrition of later stages, supervention of meningitis, miliary tuberculosis, nephritis, epilepsy, pronounced nervousness and tachycardia with pulse rate above one hundred per minute.

Types of tuberculin in short are Koch's old tuberculin, consisting of bacilli of bovine type called P.T. or of bacilli of human type called T.O., bacillary emulsion or B.L., B.C.G. consisting of living bacilli attenuated by repeated subculture to such an extent that they become non-pathogenic. Now it is more or less agreed that old tuberculin is mainly used for testing, some form of B.E. for treatment, and B.C.G. for prevention.

THE DETAILS OF THESE PRODUCTS—

Those containing exotoxin Koch's old tuberculin, T (if of bovine origin P.T.) is a glycerine extract obtained from recent six to eight weeks' old broth culture of bovine tubercle bacilli, concentrated to one tenth the volume by slow evaporation. The usual initial dose though much variable, is stated generally to be 0.00001 c.c.m. diluted with normal saline containing 0.5 per cent carbolic acid as a preservative.

Tuberculin T.O. — or if from bacilli of the bovine type, is essentially akin to the above. Only difference is that this extract is not

concentrated by evaporation. Hence being a milder preparation the usual initial dose is 0.0001 c cm.

Denys's tuberculin, is a simple filtrate obtained by passing tubercle culture through porcelain filters. The initial dose is similar to that of TO.

Those containing endotoxin,—*tuberculin TR* is an extract from recent cultures, dried in vacuo and pounded in a mortar, the more soluble exotoxins are removed before extraction. The initial usual dose is 0.0001 c cm.

Bacillary emulsion (BE) is an emulsion of dried, powdered tubercle bacilli in equal parts of water and glycerine. The initial average dose is 0.0001 c cm.

Those containing endo and exotoxin both—Beranck's tuberculin, contains exotoxin obtained from a culture of tubercle bacilli on a special peptone free medium, also endotoxin extracted from the bodies of the bacilli in one per cent solution of orthophosphoric acid. This preparation though very potent is in the experience of good workers less toxic than many others. The initial usual average dosage is 0.00001 to 0.0001 c cm. Recently A.O. tuberculin is very much discussed. Unless more work in this line is done nothing can be said definitely on it.

B C G¹¹ (Billie Calmette Guerin) is made of attenuated bovine tubercle bacilli, produced by subculturing on potato glycerin and bile over a period of years. This is mainly used as a preventive and many thousands of children have been injected resulting in successful prevention. Though there are cases reported in which a few acute attacks of tuberculosis might have been traced to the use of B C G tubercle vaccine, yet they were almost surely not due to the vaccine itself, but to some contamination.

Dosage of tuberculin. It should be so chosen that only a slight, just detectable reaction is elicited. Within the first twenty four hours there is slight malaise and quickening of pulse with little rise of temperature. The symptoms such as cough etc., and other physical signs too may be more pronounced, after the injection of tuberculin.

In actual treatment it is generally advisable to begin from a subminimal dose and work upto the optimum one. Watch should be kept on the development of hyper sensitivity. In short the interval and the amount should be determined by the reaction shown which may be either, local, focal and general or systemic. It is often judicious to repeat the initial two to three doses just short of a marked reaction.

Duration—The course may extend upto six months or more. An interval of three to six months is preferably given between the two

courses. The second one is generally of a shorter duration than the first one. The next one may be shorter still.

Hypersensitivity—may rarely develop in the course of treatment, here smaller doses short of evoking sensitivity should be tried, and the interval lengthened.

Tuberculosis dispensaries. Clinics in the out patients' departments of hospitals may be utilised for these purposes.

CHEMOTHERAPY —

Gold preparations—Sanocrysin thiosulphate of gold and sodium (Mollgaard 1923) is used. There are numerous other gold preparations some of the important ones are mentioned below. They act by stimulation of the defensive forces of the body and appear to have no direct action on the bacilli.

Indications. The chief indications of gold treatment of pulmonary tuberculosis are 1 acute¹⁸ spread of disease when the lung cannot be collapsed by pneumothorax 2 in conjunction with artificial pneumothorax in bilateral disease 3 persistence of tubercle bacilli in the sputum 4 steady spread of the disease in fibrocaseous cases inspite of other treatment 5 to check occasional exacerbations inherent in all chronic cases of tuberculosis of the lung 6 in slowly progressive disease which do not improve under ordinary methods of treatment.

Sanocrysin Dosage etc—Saglia and Tosi¹⁹ (1933) treated twenty four cases with this preparation. It may be given in five per cent solution in double distilled water beginning from the test dose 0.05 g and the second dose a week later 0.1 g gradually increased usually by weekly injections till a total of about 5.6 g of the salt is given in the maximum. For an adult with some resistance left, one can safely start from 0.05 to 0.1 g doses preferably the former, and if there is not any reaction after 0.1 g the second dose after a week may reach up to 0.25 g a week later 0.5 then 0.75 and ultimately 1.0 g at weekly intervals. The last dose should be repeated for three successive weeks till the total of 5.6 g is reached. In most cases 1.0 g is not a safe dose where 0.5 to 0.75 should be repeated weekly for a prolonged period till the total amount of salt is reached.

Those who show intolerance to this manifest milder reactions or none at all. When receiving 0.75 g Sanocrysin it should be dissolved in five c.c.m. of a ten per cent solution of calcium gluconate. For all bigger doses than the above, ten c.c.m. of a ten per cent solution of calcium gluconate is a better solvent and the reactions following injection are slighter or none whatsoever. The milder reactions

18 Craveson (1930) Tubercle II p 193 Mansell (1933) Lancet ii p 637

19 Riv d pat and cho d tubercle, Dec 1933 7 p 1107

contra lateral side is not of the type of pneumonic tuberculosis, (2) bilateral disease with numerous cavities in one and a single one or none on the other, in both these the worse lung should be collapsed first. Bilateral pneumothorax is justified but this should be undertaken with great care and caution (3) in cases of chronic fibro-caseous disease of one lung and more recent acute disease in the other rest therapy failing the recently infected one is collapsed first. After one year or so the question of collapsing the chronically infected lung should be thought of *Alternating pneumothorax*—Collapse of a newly involved lung is permissible in a patient otherwise suitable for such treatment if the acute condition has developed during the process of treatment by artificial pneumothorax. The patient may be ambulant²⁴ while undergoing such treatment, particularly in suitable cases.

*Some conditions—where good results are not obtained*²⁵—(1) In cases of pleural adhesion (2) thick walled cavities are difficult to be collapsed and (3) broad bands of adhesion remain between the layers of pleura.

the oily suspension of salganol. It is claimed that gradual, slow and uniform absorption is the advantage of this preparation. It actually has a prolonged action.

It is generally given in 0.01, 0.02, 0.05, 0.1, 0.2 g. doses. The first four may be given once each, at one to two days interval, the last dose being repeated twice a week till a total of about four to five grams of the salt is given, on an average, to an adult. But rarely as much as ten grams of the salt may have to be pushed. Oral administration of dram doses of calcium gluconate thrice daily or injections of calcium gluconate to increase the tolerance for this drug should be given when a total of more than three grams is to be pushed, notably during the later part of the treatment. It is claimed to be less toxic. But equally competent authorities hold that it has very little advantage over the aqueous solutions²⁰. Personally one has used this preparation in about twenty cases and the result appears encouraging. But it is rather expensive for the average patient.

According to Secher²¹, (1933) many of the poor results from the use of sanocresin is due to faulty and usually too low a dosage. He advocates basing on facts of animal experimentation, a dosage which appears somewhat too high and risky.

SPECIAL FORMS OF TREATMENT

*Artificial pneumothorax*²²—This method of giving focal rest by collapsing the lungs is comparable to the application of a splint on a tuberculous joint. As in all other forms of treatment this method should be instituted early and should not be looked upon as the last resort after all other kinds have failed. Artificial pneumothorax is called A.P. for brevity.

Indications—According to Brousin, (Denver—1933)²³ there are generally four absolute and provisional indications each for artificial pneumothorax.

Absolute—In (1) extensive unilateral exudative or fibrocaseous pulmonary tuberculosis, with or without cavitation and positive finding in the sputum (2) chronic unilateral fibro-ulcerative tuberculosis of the lungs, (3) profuse haemoptysis or recurrence of pulmonary bleeding, provided the site of haemorrhage is suspected rightly, (4) acute pneumoniae tuberculosis of one lung.

Provisional—(1) Bilateral disease with single or multiple cavitation of one side and the general condition of the patient is good. The

²⁰ Berrill (1930) Index of treatment, edited by Hutchinson p. 721

²¹ Medical Annual 1933 Pulmonary tuberculosis

²² Cutler (1930) Jour Amer Med Assoc 106 p. 1306

²³ Ann Int Med October 1933 7 p. 408

contra lateral side is not of the type of pneumonic tuberculosis, (2) bilateral disease, with numerous cavities in one, and a single one or none on the other, in both these the worse lung should be collapsed first. Bilateral pneumothorax is justified, but this should be undertaken with great care and caution, (3) in cases of chronic fibro caseous disease, of one lung, and more recent acute disease in the other, rest therapy failing, the recently infected one is collapsed first. After one year or so the question of collapsing the chronically infected lung should be thought of. *Alternating pneumothorax*—Collapse of a newly involved lung is permissible in a patient otherwise suitable for such treatment, if the acute condition has developed during the process of treatment by artificial pneumothorax. The patient may be ambulant²⁴ while undergoing such treatment, particularly in suitable cases.

*Some conditions—where good results are not obtained*²⁵—(1) In cases of pleural adhesion, (2) thick walled cavities are difficult to be collapsed and, (3) broad bands of adhesion remain between the layers of pleura.

A few contraindications—(1) If the lesion is healing under simple rest and medicinal treatment and the patient can afford to take such prolonged treatment. This is not exactly a contra indication (2) in very advanced cases pneumothorax should not be done as the last resort (3) If there is much fibrosis, thoracoplasty is usually more suitable. A good thoracoplasty is better than a bad pneumothorax (4) Patients over fifty years as a rule do better with simple treatment (5) In the presence of other intercurrent but serious diseased processes as asthma and chronic bronchitis A P, treatment is not suitable Diabetes is not a contra indication unless it is very grave. Many persons keep fair health with proper doses of insulin and on artificial pneumothorax therapy.

Some other conditions not necessarily tuberculous will treated by A P—(1) Bronchiectasis cases are likely to improve by A P treatment before adhesions have formed (2) Interlobar empyema and localised pulmonary abscess,—are also sometimes very successfully treated by A P (3) In pleural effusion, the fluid may have to be withdrawn and replaced by air.

A few points—Though there is difference of opinion as to whether artificial pneumothorax should be started in early cases, yet if average rest and dieto hygienic regime of a month or two do not produce the desired results, serious consideration should be given

²⁴ Jour. of Thor. Surgery Dec 1933 1 p 175

²⁵ Amer. Year book of General Medicine, 1934 p 201

to the induction of A.P. Because, if unduly delayed there may develop adhesions interfering with the ideal collapse of lung.

It should be clearly stressed that though this method does not entail much danger and serious complications are rare, yet they do certainly exist. In acute rapidly spreading cases the sooner A.P. is induced the better is the outlook. Experience and judgment are important factors in deciding the suitability of a particular case. But generally pneumothorax is induced too late than early. It appears judicious to decide in its favour whenever there is doubt as to whether it should or should not be induced in a particular case.

The method—There are numerous apparatus of which Illington and Pearson model is quite suitable, and simple. It may be used both for introduction and withdrawal of air.

A skiagram of the chest should be carefully scrutinized before the operation is actually undertaken.

Apparatus—The apparatus is properly sterilised, made ready and kept by the side of the patient.

The Patient—The patient should be lying in bed, and preferably a mild purgative given during the previous night. Half an hour before the operation an injection of morphine in $\frac{1}{4}$ gr to $\frac{1}{6}$ gr with atropine $\frac{1}{100}$ to $\frac{1}{200}$ gr, not only allays the nervousness but also makes him stand the operation well and prevents shock. The patient should be resting on the scapula of the healthy side with the affected lung upwards, and better not after a full meal. The arm of the affected side should be kept above the head. A pillow may have to be placed below the dependent shoulder to widen the intercostal spaces on the affected upper half of the chest. The best site of primary induction is generally in the sixth space in the anterior axillary line. The skin over this area is painted with iodine and sterile towels placed on the bed clothes and against the chest.

The actual operation—A few c.c.m. of a two per cent novocaine solution is introduced for the purpose of locally anaesthetising the part. The skin over the sixth intercostal space is held stretched by the surgically cleansed fingers of left hand and the needle introduced obliquely to insert a few drops of the local anaesthetic to raise a bleb. After allowing time for the anaesthetic action of the drug to take effect the needle is inserted at right angles to the chest wall, and gradually pushed through the intercostal space, above the upper margin of the lower rib, thus avoiding the intercostal vessels and nerves. As the needle is pushed on the contents of the syringe are also spurted out care being taken to anaesthetise the pleura completely and cautiously. The patient should be warned against coughing during the actual operation. If the desire for

cough is irresistible, he should raise the free hand kept over the head and warn the doctor, otherwise a sudden increase of intra-pleural pressure in the process of coughing, with the needle therein, will drive the fluid out of the manometer. This can be prevented by pressing hard the tube of connection with the apparatus by the fingers, so that while the patient coughs the impulse is prevented from being transmitted to the manometer.

Now the blunt primary induction needle (Clive Riviere needle) which is kept duly sterilised, fitted up and the instrument is tested, under sterile water to see if it is in proper working order. The needle with the trocar is pushed through the anaesthetised spot on the chest, the back should rest against the middle of the palm and should not be held as one holds the pen. The trocar is now withdrawn and the stopcock turned on so that the lumen of the needle is in communication with the tube leading to the manometer. The canula is gradually pushed down the remainder of the intercostal muscle upto the pleura. When the pleural surface is reached a small amount of oscillation may be noted in the manometer. The canula is now pushed through and the pleura is felt to give way with a snap. Care must be taken not to pierce the lung. When the canula is in the interpleural space there are oscillations in the manometer synchronous with the respiratory movements. A high negative pressure is generally indicative of a good result in the operation. The oscillations should be near about 6 to 10 cm. Thus when a reading in an actual case is -10, -2, a mean negative pressure of 6 cm of water is got. Though during deep respiratory excursion the oscillations are greater yet the reading should be taken after an average respiratory movement. If no oscillation, indicating either blockage of the needle etc., takes place, the canula may have to be cleared by the stilette supplied with the needle No 1. When contact of the visceral layer of the pleura is at the roof of the blockage, either withdrawal of the needle half a centimeter or letting in a little air locally will clear up the difficulty, and oscillations hitherto absent, will appear. Once one is sure that the canula is in the pleural cavity, air should be admitted. After about 100 c cm of air has gone in, only by the suction action of the negative pressure in the pleural cavity, to introduce more air, the bottle may have to be raised to a higher level by placing it on a few books. After the introduction of near about 300 c cm the connection with the bottles to the manometer is closed, and the final intra-pleural pressure is read out. If it is now -8 and -1, then the final mean pressure after the introduction of the air is -4.5. It is entered in the record as follows -6, 300 c cm -4.5. When air is flowing into the pleural cavity it is not possible to take a final reading. The needle is now withdrawn and the punctured area

grasped between the two fingers so that the opening is closed. Touching with tincture iodine and finally sealing the puncture with either collodion or tincture benzoin compound are all that is required. If there is a tendency towards cough, a large sterile pad and a firm binder are to be applied. The patient should preferably be in bed during the first few weeks of pneumothorax treatment.

The manometer is the heart of the instrument and always air should be given under negative mean pressure and never under a positive one, as it displaces the mediastinal contents.²⁶ The lung should be skinned after the primary induction to see the degree, type and the site of collapse. The greater the mean negative pressure the better is likely to be the collapse by this method. A slight mean negative pressure may indicate adhesion or a small limited area of intra pleural space and so on.

Refills—These are given with the same apparatus, but the other pointed needle (Stugmann) is used. The patient is prepared as before, but a preliminary injection of morphine atropine is not usually necessary unless he is very nervous. Now again in the same way another 400 to 500 c cm of air are introduced and the data entered into the records.

The interval of refills is generally two days between the primary and the first one then three days after the second, gradually lengthened to a week ten days a fortnight, three weeks and a month.

Temperature. In case there is slight fever after the primary A.P. the next refill should not be given the next day but one should wait till the temperature comes down. Any rise of temperature just before a refill is due, generally indicates that the interval between them (refills) has been unduly prolonged, and the lung is beginning to re-expand.²⁷ A rise of temperature after a refill indicates that probably too much of air is being introduced. A skogram should always control and guide the physician, notably when in doubt. As suggested already, under no circumstances air should be introduced when there is any positive pressure indicated in the manometer.

Difficulty. There may be difficulty when the needle pierces the lung or enters a bronchus, or a small cavity, or a blood vessel, or a localized inter pleural space. Under such circumstances the cannula may be cleared by the stilette or it may have to be withdrawn to be re inserted at a neighbouring spot.

Complications—Some of the complications are pleural shock,

²⁶ Burrell and Carden (1922) Lancet ii, p. 821

²⁷ Burrell, (1921) Brit. Med. Jour. 1, p. 362

it acts, such as partial obstruction to the flow of blood in the affected area, due to linking and so on

Oleothorax Though of very limited use the following are its important indications²⁹ (1) Though not in absolute indication, yet it is done, in nervous patients dreading refills or when he is in a out of the way place whence he cannot come regularly for treatment. But here too the patient should be under observation of a doctor, because if effusion takes place, the positive pressure will give rise to distressing symptoms

(2) If due to contraction of adhesions the pneumothorax becomes closed, and one desires to delay the process of obliteration. Here too thoracoplasty may have to be done ultimately

(3) In case of recurrent pleural effusion, complicating artificial pneumothorax treatment

(4) To replace tuberculous empyema, this measure, though not ideal, is often used preparatory to thoracoplasty

(5) In rare cases of very mobile mediastinum preventing a suitable collapse of the lung

The oil used though varies, yet generally, a five per cent solution of gomenol in olive oil is used. Some use ninety four parts of paraffin four parts gomenol, and two parts of eucalyptus oil.

Some times reaction follows the introduction of oil into the pleural cavity, hence about ten to fifteen c.c.m. of this should be introduced first and the result watched for twenty four hours or more, if nothing serious happens about 300 to 400 c.c.m. of oil put in finally. Skiagram should form a guide as to the degree of collapse and whether more oil is required or not.

Phrenectomy³⁰ or Phrenic section —

The phrenic nerve is paralysed either by cutting or crushing, or by pulling the nerve out. The later procedure is termed phrenic evulsion. The dome of the diaphragm rises up and the affected portion of the lung is situated at the base, gets some rest. In those cases where only temporary paralysis is required the nerve should be crushed and recovery may take place in about six months time. The question of evulsion may have to be considered if it is decided to make the unilateral paralysis permanent.

Indications —(1) In chronic unilateral lower lobe lesions, tuberculous or otherwise

²⁹ Charder (1937) Brit Med Jour 1 p 65

³⁰ Weber Jacobson and others (1936) Jour Thoracic Surg June, p 496

General condition of the patient The general health of the patient must be such as to stand the operation successfully. His tissue resistance is also an important consideration. Radiograms and other means should always be taken for guidance of the doctors at every step of this rather serious operation. A weak myocardium and active tuberculous disease are definite contra indications to this operation. If these factors operate in a particular case the patient's condition in relation to the above two should be improved by dieto-hygienic methods rest open air life etc and then the operation undertaken. This operation is done generally in two stages and the choice of anesthesia is an important point.

*Pneumolysis*²²—This operation consists in the introduction of air between the parietal pleura and the chest wall over the diseased portion of the lungs. Apicolysis is the chief operation done on the apices of tuberculous lungs.

TREATMENT OF SOME OF THE SYMPTOMS OF TUBERCULOSIS —

Indigestion and loss of appetite — are common notably in toxic cases and in those on dietetic treatment. Such patients may be given an alkaline bitter mixture like the following an hour before the principal meals followed by hydrochloric acid and pepsin after food.

Soda Bicarbonate	gr	15
Tr Nux Vomica	gr	10
Infusum Chireta	ad fl	oz 1

one dose an hour before the principal meals

Cheeratum Acid Pepsin	fl oz	3
Acid hydrochloric dil	ad fl	oz 4

one teaspoonful in a feeding cupful of water in sips after the two principal meals

Small amounts of food such as meat dishes Indian bitter curries in small portions at frequent intervals is better than big meals at a time. Amongst the indigenous cheap appetisers decoction of chireta in the morning with a pinch of sodium bicarbonate in it may be taken early in the morning. Ginger and germinating gram (Chola) chewed well in the early morning and evening often improves the appetite. Cheerful surroundings specially pleasant company good inviting preparations attractive service dining in the open air may improve the appetite. Though somewhat expensive a powder like the following after food may do some good.

Lactopeptin	gr	5
Pancreatin	gr	6
Takadiastase	gr	6
Calcium gluconate	fl gr	25

one powder after food especially in dyspepsia and weak digestion

Proper care of the teeth and instructions to chew food well may also help matters. Small doses say $1/4$ to $1/2$ gr of grey powder, twice daily, increases intestinal secretion and appetite, so also appears the action of 'Mokorodhaas'.

Diarrhoea Though the commonest cause of diarrhoea is toxæmia, yet not uncommonly milk diet may excite it, hence it (milk) should be cut down or reduced whenever this is suspected to be a probable factor in producing this symptom. In some cases specially if due to the disease, intravenous injection of some suitable casein salt, twice a week may be of some help. But rest, fresh air, artificial pneumothorax and other measures to reduce the toxæmia may help along with concomitant symptomatic treatment. Diarrhoea caused by active ulcerative tuberculosis is a grave condition and very difficult to manage. Dovers powder in three to five grains morphine atropine in suitable doses, or ammonium in $1/3$ to $1/6$ gr may be of some use in very intractable conditions. Anæsthesia if associated should receive proper treatment. Calcium gluconate given intravenously or intramuscularly twice a week, sometimes does good.

Vomiting This should be treated according to the cause. Cough is often the direct exciting factor and should be allayed by those means mentioned below. Other causes demand suitable treatment.

Cough Cough may be useful in rousing expectoration. It may be fruitless, irritating and of a hawking type. The useless cough may be checked by the patient easily if he takes a deep breath and presses the jaws tightly by clinching the teeth. A cough whatever the underlying factor is very well combated by hyper ventilation and open air life. Smoking is as a rule injurious and should either be given up or restricted materially. Sometimes the patient thinks that the cough is good for him, but he should be made to understand that unnecessary coughing tends to injure the lung and cause emphysema by undue strain on the organs and even may force the disease to other comparatively healthy parts of the lung. A lozenge containing about three grams of extract of liquorice and half a minim of oil anisi may be kept in the mouth with advantage. Evans' pastilles are also at times useful to allay an irritating throat cough.

Due to unchecked irritating cough the patients sleep and rest may be interfered with. Under such circumstances any one of the following prescriptions specially used at bed time may be of some use:

Spirit chloroformii	m	5
Oxymel	fl oz	?
Acid hydrocyanic dil	m	2
Syrup Codlinne Phosph	m	20
Aqua distil	ad fl oz	1

one dose when required

Tincture Belladonna	m	6
Diamorphinæ Hydrochloride	gr	1/6 to 1/32
Bromoform	m	2
Glycerinum	m	10
Syrup pruni serotini	ad fl	oz 1

one dose when required. But it is better that none of the above mixtures should be repeated before three hours.

Codene phosphate in 1/4 to 1/2 gr doses, dionin in 1/4 to 1/2 gr or dimorphine hydrochloride or heroin in 1/12 to 1/32 of a gr doses may have to be given, the first thing in the morning and the last thing at night. Tincture belladonna, in three to five minims, tincture hyoscyamus in ten to thirty drop doses with menthol may allay the cough.

To help expectoration early in the morning the well known Brompton hospitals simple mixture is of value. One like the following is of use too:

Sodium Bicarbonate	gr	15	.
Sodium Chloride	gr	5	
Spt Chloroform	m	8	
Syrup Tolu	m	60	
Aqua Amisi	ad fl	oz 1	

one dose early in the morning with half a cup of hot water in sips. In other cases five to ten grains of ammonium chloride may be added to the above mixture with an increased expectorant effect. In cases where bronchitis gives rise to the cough, potassium iodide in three to five grains may be exhibited thrice a day, but with some caution, as the iodide may dissolve the barrier and help in the dissemination of tubercle bacilli.

That intractable cough due to *atresia of the diaphragm* may not be relieved by anything else except by causing paralysis of phrenic nerve on that side.

In chronic inflammation of the lungs, potassium iodide in three to five grains, twice or thrice may have to be tried. Along with potassium iodide, some stimulant expectorant like, tincture specae or ammonium chloride may do good in these chronic cases.

Pain The cause of the pain should be determined whenever possible. When due to pleurisy, strapping of the parts, counter irritants, such as camphorated oil or liniment A B C, may be of use. Application of warmth after and before rub of the counter irritant liniments may help much. Applications of linseed poultice or *eritaphysma kroliki*, may also be of relief. Artificial pneumothorax and thus separation of the two layers of the pleura may be the last resort. Symptomatically the pain may be relieved by either veramion or salidro or anacin tablets.

three to five grains each. But wherever possible the cause should be found out and proper treatment adopted for the radical remedy of it.

Dyspnoea This may be caused by numerous factors such as, chronic fibroid disease of a big area of the lung causing mediastinal displacement or not, in association with asthma or in myocardial weakness or due to superimposed bronchitis and so on.

In the average case an open air life is one of the best means of combating this condition. Inhalation of oxygen may do good in suitable cases. When required, the patient should be propped up by pillows. As an emergency measure spirit ammonium aromaticus in half to one dram doses in a little syrup and lemon water may be helpful. When due to obstruction by mucus etc., ammonium carbonate or chloride in five to ten grains with syrup scilla and infusum senega may help by clearing up the tubes.

Dyspnoea of artificial pneumothorax may be successfully relieved by the injection of small doses of morphine and atropine. That due to myocardial weakness may be relieved by half a grain doses of ephedrine orally, or injections of veritol, digitalin etc. and other cardiac stimulants.

Pyrexia —One of the best agents to lower the intractable pyrexia of tuberculous patients is open air life. Sometimes cases take months to be apyrexic when kept indoors and such cases when kept more or less in open air outdoor regime get apyrexia in comparatively much shorter time.

The patient not only should follow the dieto hygienic measures but should avoid any physical or mental fatigue, excitement and gastro intestinal irritation as these may readily affect his temperature. In all febrile cases the oral temperature should be recorded and charted every four hourly. This helps in ascertaining if there is any uniformity in the recurrence of the pyrexia and if there is any relationship with the time of exercise meals treatment and so on.

Fatigue indicates rest Castro intestinal disturbances should be combated by proper treatment and change of diet to a simpler and more easily digestible one. In cases of intestinal irritation an effective dose of castor oil may do unexpected good.

Some times a cool or tepid sponging with toilet vinegar, in suitable cases may do some good.

Antipyretics are though as a rule contraindicated, because to check the fever without trying to remove the cause is not a very rational way of treatment. Yet in some cases equinine in two to four grains or ergogenin in two to four grains may be tried. But the latter tends to cause loss of appetite hence is not always safe. These remedies should be given every three to four hourly particularly an

hour or two before the fever is expected. In view of the agranulocytosis produced by pyramidon, it is not safe. When there is a weak digestion and fever, a prescription like the following may be of some good. But it has the disadvantage of being rather expensive. One powder every four hourly during the height of fever and after meals. It is of particular value in pyrexia associated with carbohydrate dyspepsia. Addition of lactopeptin instead of takadiastase may make it of some use in dyspepsia of protein foods.

Cryogenin	gr	3 to 4
Calcium Gluconate	gr	6
Lvt Parathyroid Sicum	gr	1/10
Pancreatin	gr	5
Takadiastase	gr	5
Sugar of Milk	ad gr	25

Persons who were used to alcohol, may be given two to four drams of some of the strong liquors, such as brandy or whisky etc., either with alkaline water or in egg flip or warm milk an hour before the expected rise of temperature. Alcoholic drinks are best given in full stomach. When so given they are least injurious. But for appetising purposes, they are given an hour or so before meals, preferably with some bitter. Beer due to its bitter taste is taken by some for increasing the appetite. But in all infections alcohol is better avoided.

Night sweat This rather late symptom of pulmonary tuberculosis is again successfully treated by *open air regime*. When the sweating is profuse enough to break the sleep and not uncommonly disquietening to the patient an open air life improves this depressing symptom sometimes to a great extent. Before the patient retires finally to bed a thorough sponging given with a solution containing equal parts of saturated solution of alum in aqua distil and rectified spirit, and subsequent dusting well with talcum powder may be of service. When equal part of talcum powder and zinc oxide are mixed together probably this purpose of dusting is better served. *Cream of tartar*, which might be of some use are, agaricin—in 1/10 to 1/6 gr. atropine in 1/100 to 1/200 gr or extract belladonna sicum in 1/8 gr doses at bed time. Tincture belladonna in five to ten drops may also be tried. But all experienced workers agree that a sound *dieto hygienic and open air regime* are the best to combat this rather uncomfortable symptom.

Insomnia The cause should, if possible, be found out, any flatulence, constipation, gastrointestinal disturbance, irritating cough, etc should receive proper treatment. An open air life, specially during sleep is one of the best preventives and cures for this condition. Any warm drink such as, vitavose, ovaltine, in milk, before retiring, may do

some good Coffee, tea etc , are better avoided due to their caffeine content, which tends to keep the higher psychic centers stimulated and thus promote sleep lessness

Anæmia —It should be treated by iron arsenic, on usual lines For the details the chapter anæmia should be consulted

Cavities They demand the same line of treatment as the disease itself Rest, artificial pneumothorax and other means of combating the disease are also effective here

CHAPTER X

DIPHTHERIA

Diagnosis —

There are two examinations too often overlooked or slurred that should be made in every instance of infection in infants, unless the lesion is more than obvious and even then in search of complications, namely the ear and the throat. Ignorance comes to almost every man who wilfully or inadvertently overlooks these procedures.¹

The examination of the throat should be done with a definite purpose namely to get a clear view of the tonsils, pillars of the fauces, and the pharynx. No amount of resistance should prevent the cautious medical man to get a clear view of the throat and ear of the young patient. Proper technic in examination appears indispensable in order to see the throat and thus give least trouble to the sick child. The tongue depressor should be placed well back on the tongue depressing it quickly, and by asking the patient if co-operating to put the tongue fully out, in good light so that one can see all that is desired. For this purpose an electric torch and a spoon suspicion should be treated by adequate doses of diphtheria anti-toxin.²

In children every inflamed throat should be regarded as² suspicious and the clinical diagnosis should be supplemented by bacteriological examination before any antiseptics are applied locally. But cases arousing the least suspicion should be treated by adequate doses of diphtheria anti-toxin.³

A membrane stuck on the surface of the fauces or on one or both tonsils or on adjacent parts of the throat is generally diagnostic. Tonsillar inflammation if unaccompanied by hoarseness or rhinorrhea or albuminuria is highly suggestive. As a rule pillar of the mucous membrane and absence of pronounced fever are striking features of the disease.⁴ These remarks are worth remembering for diagnosis of diphtheria. Diphtheria being by nature a comparatively fatal disease young practitioners may have the idea that it gives rise to high temperature and other corresponding groups of associated signs and symptoms. Besides the above mentioned signs and symptoms there may be headache, malaise, undue fatigue and so on. But they may be altogether absent hence the supreme importance of the routine examination throats in children even where other apparent morbid states are present and the presence of diphtheria is not very likely.

In laryngeal Diphtheria Croupy cough, stridor and hoarseness of voice are diagnostic but they may be lacking too. Dyspnoea of an inspiratory type in young patients should arouse suspicion.

But bronchial asthma, foreign bodies in the respiratory passages and similar conditions should have to be differentiated from true diphtheria of the larynx.

1 F. S. Meara (1921) Treatment of acute infectious diseases p. 442
Macmillan Co.—1921 N.Y.

2 Text book of the practice of Medicine Edited by F. Price—Diphtheria p. 47 1921

3 Jour Amer Med Assoc March 7th, (1926) Vol 103 10 p. 874

Suggestive points in diagnosis of bronchopneumonia are,—the temperature ranging higher than usual, altered pulse respiration ratio and some times the working of the accessory muscles of respiration, and typical physical findings in the lungs and so on

Paralysis—Post diphtheritic paralysis is encountered in about twenty to forty percent of all attacks of the disease though different epidemics may show difference in incidence of this complication. It is commoner in the younger subjects

This paralysis is due to degeneration of nerve fibres from the absorption of toxins. The local paralysis, due apparently to the action of the toxin locally, as well as from the effect of that absorbed occurs most frequently on those parts involved by the membrane. The local paralysis is diagnosed either by nasal voice, inequality of motion of the soft palate and regurgitation of fluids through the nose. There may be loss of sensation in the throat, and also the power of deglutition. Not infrequently diagnosis of diphtheria is first made when the patient is seen for paralysis. There may be paralysis of the intrinsic and extrinsic muscles of the eye with loss of accommodation and inability to read. Extensive paralysis of the skeletal muscles is not rare. Some patients show severe paralysis with involvement of even the diaphragm. Generally these appear from three to five weeks after the onset. Under competent treatment it may take several weeks to clear up.

Adenitis—The cervical glands are frequently involved and may give the only clue to the diagnosis. The glands may suppurate specially in severe cases where superinfection by strepto or staphylococci of high virulence are common. These changes appear, according to the resistance of the child, the nature of the secondary infection, delay in starting specific treatment and so on.

Rashes—Those appearing early in the disease are of serious import, and may be of erythematous or other types. Haemorrhagic rashes generally mean a very severe infection. These should be distinguished from serum rash.

Otitis Media—Diseases of the middle ear through the Fustachian tubes, are frequent in throat affections. In debilitated patients the sequela of otitis media is mastoid abscess may rarely be met with.

Association of other diseases—There may be associated whooping cough, measles and other infections which also make the outlook correspondingly grave.

Toxic Diphtheria—Since last few years both in Europe and North America cases of toxic diphtheria are on the increase. In many cases the initial stages of the disease are atypical and first important hours go by without a diagnosis being established. Sero therapy is then attempted but it comes too late to be of any benefit.⁴ Diphtheria⁵ gravis or grave diphtheria is also increasing, none can as yet definitely say why it is so. Finally, let it be pointed out that, according to the modern view, diphtheria may be reckoned as a state of general illness where in the tonsillar changes are only secondary phenomena conditioned by the elimination of bacilli.⁶

4 Calmanis (1934) These de Paris No 325

5 Foreign Letters, Jour Amer Med Assoc (1936), April 10th, 106 16,
p 1404

6 Parish and Wright, (1935) Lancet 1 p 600

TREATMENT

Prophylactic. When a case occurs in the school or in the family, all susceptibles should be isolated and kept under supervision, their throat swab regularly cultured and proper methods for immunisation adopted.

For immediate, passive, short lasting immunity, about fifteen hundred units of some dependable diphtheria antitoxin may be injected subcutaneously or intramuscularly. This should always be supplemented by the simultaneous injection of one fourth to half a cm or ⁷ more, according to the age of the subject, of an alum precipitated toxoid.⁷ It can be given to persons above or about the age of one year,⁸ specially when found susceptible by a proper Schick's test. These toxoid injections may be repeated at seven to ten days interval, till three are given.

The protective immunity of antitoxin generally lasts for one week or a little more, but this active immunisation by the injection of toxoids, is seldom just protective enough, before three weeks, and as a rule, not until the second month, in some cases may be delayed up to the sixth month. When tested after three months about seventy-five percent are protected by one dose of toxoid only, about ninety percent by two doses and nearly ninety five or more percent, by three doses.

This and similar methods of active¹⁰ immunisation against diphtheria have won a second battle, in the more progressive countries, next to that against smallpox, in the fight for prevention of diseases.

Disinfection and Isolation. The bed linen, the utensils, secretions, excretions and other articles coming in contact with the patient, should be properly disinfected, and the patient isolated.

Personal care and risk of spread of disease. The doctors and nurses should not only be careful of themselves, but they should also take all possible care not to risk other patients' lives by carelessness in prophylactic measures. Diphtheria may be transmitted through the negligence of careless doctors and nurses acting as contact carriers.

CURATIVE TREATMENT

General Measures.—Room. In the absence of a room which is sunny and airy the patient may be kept in an open verandah. Fresh air and sun light are important hygienic measures and should never

7 Jour Amer Med Assoc (1930) January 11th 106 2 p 118

8 Jour Amer Med Assoc April 18th (1930) 106 16 p 1399

9 Michie (1930) Jour Amer Med Assoc 106 p 1750

10 Bonsfield (1935) Diphtheria immunisation etc Practitioner 175 Dec p 821

be neglected, and wherever possible their importance should be stressed upon the guardians

Bed.—should be as that of the typhoid patient

Rest. According to Joe¹¹ (1936), in general management of a case, the keynote is in the maintenance of the recumbent position and the avoidance of all effort. The patient is initially given no pillow, and in bad cases showing grave cardiac involvement the foot end of the bed should be raised. Sitting up in bed or other strains or efforts may, in severe cases even kill the patient. *This period of rest in bed, should be about four weeks in all average or mild cases and in bad ones for about six to eight weeks or longer.* During the latter part of this period, pillow under the head may gradually be allowed.

After this period of absolute rest the patient may be permitted just to leave his bed and be put on a reclining chair, but the effects of this strain on the heart should be very closely watched. Gradually, if things proceed smoothly, he may be allowed to move only a few steps inside the room and then finally by the end of two months he should be taking short walks. In milder cases the above routine may be hastened up cautiously. But grave cases showing cardiac weakness, paralysis, nephritis, naturally require a correspondingly slow and cautious line of management. They should be confined to bed, even for a longer period, say about eight to twelve weeks, flatly lying all the while in bed, then gradually allowed to assume a reclining posture. Failure to observe this cautious but necessary plan of rest has, not infrequently, caused loss of apparently recovering cases notably through heart failure.

Bowels. Average young patients may require either, simple glycerine enema daily consisting of an ounce each of warm water and glycerine to be given by a glass enema syringe, or soap water douche may have to be given. But all straining at stool, should be avoided by keeping the consistency of the intestinal contents soft by either dilute saline purges or liquid paraffin orally, or any other suitable laxative.

Urine. The quantity of urine should be always noted. Appearance simply of albumin may be due to fever and toxæmia, but the presence of casts means nephritis, a serious condition, which deserves due attention and care.

Cover the Abdomen and the Kidneys.—The abdomen and the kidney regions should always be kept covered by either a flannel or some other suitable binder, to prevent local chilling, as it tends to irritate nephritis.

Diet There is generally much loss of flesh due to factors discussed already. Destruction of tissues may be due to (1) pyrexia (2) toxæmia (3) starvation, besides other causes.

Generally, owing to the painful conditions of the throat the patient at the beginning has got to be fed on liquids, like milk and its preparations, supplemented by enough glucose, say three to five ounces per day, dissolved in water, flavoured with lemon or orange juice. Spoon feeding is suitable. As soon as the throat condition permits, the diet should be increased to milk puddings, eggs beaten in milk, custards, jellies, smashed potatoes, pounded fish, minced chicken, or any thing within the limits of the digestive capacity of the patient. In Indian homes one can add soft boiled rice, smashed potatoes with pounded fish, boiled fried paddy, or *chifitok*, called "*Khomondo*" or "*Chiramondo*," the decoction of lentil's etc. Besides these, fruit juice, whey, butter milk etc., may suitably be given.

But one should remember that in diphtheria, both angina and pharyngeal paralysis, may make the feeding exceedingly difficult. If due to pain, regurgitation through the nose and disinclination, the diminished food intake threatens the strength of the patient, food should be administered by gavage or by the rectum. The stomach tube is one of the best for this purpose. But when the patient is more than three years old nasal feeding is one of choice. Stomach tube is easy to be used for children under three years. In *painful throat conditions*, the patient's disinclination for food and drink may render him dehydrated, here Murphy's rectal drip method should be taken resort to. Intravenous or intramuscular glucose is often life saving¹² in these dehydrated toxic cases.

Mouth throat and nose To keep them clean by a warm alkaline saline, with ten grains of sodium bicarbonate to an ounce of normal sodium chloride solution is beneficial. When they are kept clean, the downward extension of the disease is checked and the secondary infections are also kept down.

The spray of a mixture of diphtheria antitoxin and streptococcus antiserum in equal parts, is used by some observers with good results.

Ear As extension of the throat infection by the Eustachian tube to the ear is not uncommonly the cause of otitis media. The ears should always be carefully examined and that daily, specially in cases of pains or aches or in pus formation therem.

Nursing Nursing should not only be efficient but should also be cautious. Daily sponging with tepid water once, preferably twice a day, careful toilet of the mouth, proper care of the eyes, ear, nose,

throat is imperative. The toilet should not throw any strain on the patient, and need be performed with great gentleness. *Careful record of pulse, respiration rate* specially any irregularity of the former, a note as to the quantity and quality of the urine and stool, sputum if any, and other cogent matters of importance should be recorded for the inspection and information of the doctor.

SPECIFIC TREATMENT —

Early and adequate The two main principles in giving specific diphtheria antitoxin are an *adequate dosage* and *as early in the disease as possible*. Generally for the clinician the best plan would be to give the antitoxin in sufficient dosage in any suspicious case without waiting for the bacteriological confirmation.

Dosage There are many points modifying the dosage of the antitoxin. But generally the extent and severity of the local lesion, adenitis faecal and palatal oedema, fetor, amount of toxæmia, severity of the attack, and lastly the day of the disease supervension of complications or not, pulse rate and so on, will go to determine the dosage of the antitoxin to be administered. As young children are liable to have more severe attacks and as the toxins liberated from the sites of infection are not in any way lesser, due to tender age or smaller size of the patient, all the English workers do not make the dose smaller and that rightly too, as compared with that given in comparatively older patients with a bigger sized body. In practice, since we find that a single large dose of the antitoxin given early in the disease affords better results than comparatively smaller doses repeated at short intervals though the total dosage given by the latter method may be bigger than the initially given large single dose. The ideal would be to give *adequate dosage of serum as early in the disease as possible* instead of spending valuable time on smaller repeated ones.

The dosage usually employed is about twenty to forty thousand units by a single injection in mild cases with slight patch on one or both the tonsils, having only slight or no adenitis and without any toxæmia. It may have to be repeated if required. This dose is also employed for purely nasal cases. In cases of moderate severity, in which both tonsils are covered with membrane with a tendency to spread to faucial pillars palate uvula and in the presence of slight toxæmia with moderately enlarged glands should receive two successive doses, of thirty to forty thousand units each. Severe cases, with extensive membrane in the fauces and nasopharynx, pronounced local oedema marked adenitis quick pulse, intense toxæmia, prostration as shown by drowsiness albuminuria, should get sixty to eighty thousand units or more, to be repeated on successive days according to indications.

It may not be out of place to mention here, that the day of the

disease, may form a rough guide as to amount of the antitoxin to be given in a particular case. But here too one should remember that the extent of the membrane may not form a safe guide as to the dosage of the antitoxin to be given as some of the grave cases may only show small patches of membranes whereas, extensive membranes may be encountered in comparatively mild cases. But faecal oedema, toxæmia adenitis prostration pulse rate, the day of disease etc however will give a clue to the severity of the case and to the dosage of the antitoxin to be given.

Laryngeal Diphtheria In a laryngeal diphtheria as the signs of obstruction of the trachea appear quite early leading to diagnosis and that generally before much of the toxin is absorbed in the system the patient may not require more than forty to fifty thousand units of the antitoxin. But if severe faecal or nasopharyngeal lesions are present in addition, the maximum dosage as indicated in severe cases is to be given.

Wounds or Conjuncti &c etc In diphtheria of the wound or conjunctiva, the dosage should be as in moderately severe cases of diphtheria.

Practical Points In the treatment of diphtheria the practitioner should not be misled by any mistaken view of anaphylaxis (see serum therapy) but should always remember that to spare antitoxin is to spoil the patient's chance of recovery. In very severe cases even enormous doses of the serum may not produce any appreciable anaphylaxis. Moreover the introduction recently of concentrated refined antitoxin has made the incidence of all these unpleasant symptoms negligible. As the importance of early administration of antitoxin has already been emphasised so also one should bear in mind that it is a mistake to suppose that antitoxin is useless after the fifth day of disease as is sometimes taught. Though late administration of the antitoxin is not so efficacious yet there is no doubt that apparently hopeless cases have been cured by massive doses say two hundred thousand units given late in the disease.

Route and Site of injection

The outer side of the thigh is a suitable place for intramuscular injection of the antitoxin. Thigh is a better place than the buttocks because not only there is lesser risk of injuring important blood vessels and nerves but also because the femoral muscles are more compact and thus help rapid absorption of the antiserum by exerting pressure on the injected fluid. For practically all mild and slightly bad cases this is the route on which the medical man can depend. But before all serum injections the doctor should exclude asthma in the patient or in the family or former history of serum

administration in the patient and so on. For this the chapter on serum therapy is to be consulted.

In all moderately severe cases the major part of the refined concentrated serum should be given per vein. But before giving serum intravenously all remote possibility of sensitiveness should be excluded cautiously otherwise when serum is given intravenously in a sensitive patient there may be sudden death due to anaphylaxis. But fortunately this risk has been very much minimized by the introduction of refined concentrated sera because from the latter the reaction and allergy producing elements have been practically eliminated. In all severe cases no pains should be spared to give the total quantity of serum intravenously.¹² The veins of children are not apparent for easy intravenous serum administration. In such cases antitoxin can very well be given by the intraperitoneal¹³ route. This is carried out by the ordinary syringe and needle the latter being pushed through the anterior abdominal wall in the middle line about two inches below the umbilicus. The bladder of the patient should be empty.

The refined and concentrated sera has made possible the introduction of very large units of antitoxin in a small bulk. A still greater amount can also be administered by detaching the syringe from the needle for refilling while the latter is still in the vein or in the peritoneum. But care must be taken to choose a dependable brand of the antitoxin in all cases of diphtheria.

In treatment the dosage of the antitoxin should always be so chosen that one errs on the side of over than on the side of under dosage. Whenever a practitioner is in doubt as to the amount of antitoxin to be given in a particular case of diphtheria after due consideration of all the factors modifying the dosage he should invariably give the relatively bigger one of the two doses chosen.

Glucose and Insulin.—As in all forms of toxemia so also here glucose and insulin¹⁴ are useful. The working principles consist in giving double the amount of glucose in grams as the number of units of insulin. For example if fifty c.c.m. of twenty five percent solution of glucose that is twelve and a half grams are given per vein or intramuscularly about six units of insulin should be given for that amount of glucose. This should be given every twelve hours in severe cases.

In those cases where veins are not prominent enough injections

¹² Mearns (1921) Treatment of acute infectious diseases Diphtheria p. 400
Macmillan Company New York

¹³ Joe (1936) Treatment in general practice Diphtheria p. 196 Lewis
London

¹⁴ Bennett Hughes etc (1937) Lancet 1⁹⁹ p. 281

of twelve and a half percent solution of glucose¹⁵ into the subcutaneous tissues, preferably in to the muscles, followed in half an hour to an hour's time by suitable units of insulin may be life saving.

Rectal Glucose Saline—

Two to three ounces, according to age, of five percent glucose solution in normal saline, with one drachm of sodium bicarbonate to each pint, should be given rectally by the Murphy's drip method in all bad cases, to supplement the intake of fluid. This is of special use in toxic diphtheria.

Oral Glucose Glucose, one hundred to two hundred grams or four to eight ounces should be given orally well diluted either with lemon juice or in food and drink.

Saline Not uncommonly cases of severe diphtheria, require subcutaneous saline about eight to sixteen ounces every twelve hours. There are cases of intense toxæmia with dehydration treated by regular saline glucose and insulin injection, with gratifying results. Dehydration may cause death and the remedy lies in giving salines subcutaneously, rectally and orally. Where subcutaneous or rectal method of saline infusion can not be availed of, a two percent saline with sodium bicarbonate and glucose, about one drachm of the alkali and two to four ounces of glucose per pint, may be of much use given orally, in sips. Personally I have tried this in cases of toxic diphtheria, pneumonia etc associated with dehydration and got encouraging results. It is always worth a trial specially in bad cases. The supportive line of treatment by glucose insulin, saline, etc has got to be continued in bad cases up to one to three weeks or longer.

Blood Transfusion in Malignant Diphtheria—Recently Seckel (1935) emphasises that blood transfusion is an important auxiliary therapeutic measure in malignant diphtheria. Besides adequate amounts of antitoxin, about three to four hundred c.c.m. of the donor's blood was used. The antitoxin titre of donor's blood is not of importance. Cases having extensive oedematous swellings of the neck and the periglandular tissues, sero-sanguinous nasal discharge, hemorrhagic tendencies, pallor, vomiting and also in extensive membrane formation, when received transfusion within four days of the disease, had their mortality rate brought down from about eighty to forty percent.¹⁶

Cardiac Failure—At the first sign of this the foot end of the bed should be elevated. Vomiting and cardiac pain may have to be treated by hot fomentations over the precordium. Oral feedings

¹⁵ Hoyne and Welford (1934) Jour of Pediat Vol 49

¹⁶ Seckel (1935) Medizin Klinik Berlin Dec 6th 1935 p 1603

are contraindicated and only rectal, subcutaneous or cautious intra venous methods of giving saline and glucose, should be adopted. All disturbances, efforts and strains should be avoided and spared to the patient at all cost

Cardiac stimulants,—such as solucamphre, cardiazol, strychnine, camphor group, caffeine, ether, atropine, ephedrine, adrenalin, are of some or little success. Veritol and ephedrine may be of some use

Recently hot baths at 105 to 110°F have been advocated for vasomotor collapse in diphtheria, the patient being brought to the bath very cautiously, and kept in it for ten to thirty minutes. But often this entails too much strain on the young patient, hence Joe (1936) has advocated hot air bath instead of hot water bath. But we have found electric baths given by electric bulb fitted up in a cradle to be also of some use. Where these mechanical devices are not available, several hot water bottles well protected by towels or other suitable methods, not to cause any burning of the skin, and covering up the patient by blankets, may help to tide him over these critical moments. In all cases of quick pulse, in comparatively grown up children, strophanthin and glucose per vein may be tried, as in young children digitalis group of drugs are not of much effect. Patients showing any severe degree of cardiac weakness should be warned against taking any strenuous physical exercise for at least six months after convalescence from diphtheria.

Paralysis In mild cases of paresis or palsies spontaneous recovery on some suitable tonic like that of Easton's syrup may be quite easy. But in more severe cases the patient should be given strychnine in liberal doses, and according to indication atropine, ephedrine, adrenalin, caffeine etc. In paralysis of the diaphragm, carboxygen inhalation and other suitable methods are indicated. In advanced countries oxygen tents are used with great usefulness. In the paralysis of the skeletal muscles, massage, counter irritants or camphorated oil rub, passive movements and electrical treatment may be necessary. Injections of B vitamin or liver extract orally, may help in hastening recovery.

As all fluids are regurgitated through the nose, diet should be given in the form of semi solids. For this purpose smashed potatoes, sago pudding, custard, jellies, ice cream, etc may be used with advantage, other liquid foods may be made semi solid or pasty by the addition of Benger's food or some such suitable agents. When the paralysis is more severe, nasal and rectal feeding should be taken resort to. But in oral feeds with peralysis there is the risk of food passing into the

respiratory tract resulting in broncho-pneumonia Nephritis and broncho pneumonia should receive their appropriate treatment

Laryngeal Diphtheria In the hospitals of a few of the advanced European countries, endoscopic methods have materially improved the diagnosis and treatment of laryngeal diphtheria

As soon as there is suspicion of laryngeal affection, antitoxin should at once be given, and that according to indication For this seldom more than thirty to forty thousand units are required, for the early cases When signs and symptoms of dyspnoea develop hot fomentation to the neck, inhalation of steam with tincture benzoin compound vapour, or sedatives like potassium bromide and chloral hydrate each in three to ten grain doses, according to the age of the child and *prompt intravenous administration of antitoxin* in fifty thousands units, may even avert a tracheotomy In America and Europe suction of the membrane through the laryngoscope is practised¹⁷ This whole operation only takes a few minutes and no general anaesthesia is required and there are quite a number of advantages in its favour

The details of the processes of intubation and tracheotomy though are beyond the scope of the present work yet a few important points about the latter may not be out of place

Tracheotomy If, besides stridor and aphonia, there are cyanosis, spasms of cough, dyspnoea, restlessness, and marked recession of the soft parts, specially the lower intercostal spaces, pit of the stomach, and at the root of the neck, an immediate operation is necessary In the hospital, though under such circumstances, one can afford to give the expectant treatment a trial, yet tracheotomy is the only means of giving relief to the suffering child, notably in private practice

Generally, in the actual operation, the child is wrapped tightly by a bed sheet or a blanket to control the arms and legs and placed on the table with a sand bag between the shoulders The cricoid cartilage is felt and an incision of about an inch is given below that, exactly in the middle line, and always care being taken to go on deeper *exactly in the middle line*, otherwise trouble will crop up After the incision the rest of the operation is preferably done with the help of the dissecting forceps and retractors etc till one comes upon the rings of the trachea, the upper two of which, felt and when made sure, are opened up by a knife, and a tracheal dilator used to dilate the opening Care should be taken to prevent the sudden expulsion of frothy sputum, during fits of cough of the patient, to come in contact with the eyes of the doctor Once the sputum, and mucous

are coughed out, the tubes are properly put in and the boric lint inserted between the shield and the skin to prevent infection and boring in, of the tubes. For the details of this very important operation, the suitable monograms or text books should be consulted.

Aftercare Though there is much relief to the patient after tracheotomy, yet the whole success depends upon the early successful removal of the tube. The inner tube should be cleansed up by a sterile feather, whenever it gets blocked by accumulated sputum. Also the inner tube needs proper cleansing, every few hours after removal, by soaking in a strong boric acid solution. The outer tube should on no account be allowed to be removed. After twenty four to forty eight hours of antiserum treatment, when the passage is likely to be clear, every effort should be made to replace the metal tube by a soft rubber one, which also should be removed subsequently as soon as possible. The sooner they are removed the better. Before finally removing the tube, trial should be given, by closing the opening of the tracheotomy tubes by the finger tip and if then also no dyspnoea occurs, it is safe to remove them finally.

Though the obstruction, in some cases, specially if the tube is left long, mainly is psychological, yet organic obstruction due to granulation above or below the wound may be the cause of the lingering late dyspnoea. Bronchopneumonia of varying severity, due to aspiration of the septic material, as well as due to inhalation of infected air directly, may follow within a day or two of the operation and need general lines of management. Stimulants, oxygen, good nourishing diet, glucose and insulin saline, sedatives and so on, are all indicated according to circumstances.

Isolation The patient should be isolated till two or three consecutive weekly cultures of the throat swabs have proved negative.

Convalescence In all grave cases the recumbent posture should be maintained, as suggested in the preceding pages, for about three months or more. Suitable open air life, tonics, iron, arsenic, nervomimica and vitaminous diet, specially with adequacy of codliver oil, and fruit juice, eggs, milk and others. Ferradol, and syrup minadex are suitable to improve the general condition of the patient.

Carriers Unless virulent diphtheria organisms are obtained from the throat or any suitable part of the system of an individual by culture, one can not label him as a carrier. If so proved, he should be treated for the eradication of the carrier state. The first step in this direction is to improve the general health of the individual. Tonics, vitaminous food and medicines, open air life and exercise are helpful in this direction. Insufflation of dimol into the throat and nose, by an atomizer may be of some use. Irrigation of these parts by a

CHAPTER XI

INFLUENZA

Diagnosis —

Clinically During epidemics and pandemics the diagnosis presents little difficulty in cases beginning with chill fever of short duration headache, general pain, loss of appetite prostration out of proportion and so on Catarrhal disturbances of the naso respiratory tract are generally the rule but they may be transient and overlooked in the predominance of nervous and gastro intestinal symptoms But this disease may show protean manifestations and may simulate many other conditions

Pronounced malaise and prostration of influenza tends to differentiate it from ordinary coryza Enteric fever is slow in onset and does not usually show initial coryza and other symptoms characteristic of influenza

Influenza Pneumonia It presents very little difficulty during epidemics or pandemics Insidious onset without chill or stitch at the side with thin reddish bloody or purulent sputum in contrast with the rusty tenacious sputum with sudden high temperature leukocytosis, localised signs and symptoms confined to one lobe and terminating by crisis in lobar pneumonia Influenza lung complications are usually patchy and bilaterally distributed, that is generally broncho pneumonia with wider fluctuation in the temperature and a more prolonged course There is generally a leukopenia in all these cases of influenza During the pandemic of 1918 cases of lung involvement showed remarkably serious symptoms though at the beginning one could hardly foresee the seriousness of such affections They became prostrated deeply cyanosed and died ultimately in a state of coma no treatment being of any use At autopsy they showed dilatation of the capillaries and a great dilatation of the right heart

In some cases severe symptoms of trichitis and bronchitis pervaded the whole picture

A slow pulse of about hundred per minute when accompanied with high fever and a fairly toxic state is a striking feature and often diagnostic of the disease Even when pneumonia would set in the pulse rate would not be accelerated materially and this is a point of diagnostic significance In the pandemic of influenza of 1918-19 the incidence of this disease was higher in young and healthy adults than in children and elderly persons of robust physique seemed to suffer more than persons of poor health The crusative organism did not attack persons of low general resistance but queerly the robust and healthy persons were chosen out

Sinusitis Recently influenzal attacks are associated with sinusitis in a large proportion of cases

TREATMENT

Prophylaxis As the disease, in all probability, is caused by a filter passer¹ the exact methods of sure prevention are not known yet One of some use is a prophylactic vaccine, mostly against the

¹ Dohlez and others (1936) Studies of virus of Influenza—Jour of Expt Med N York, 63 April 1st p 681

secondary infecting agents of this disease. As to the composition, dosage of the vaccine, the following organisms, *Bacillus pfeifferi*, *pneumococcus*, *streptococcus*, *M. catarrhalis* in proportions of ten of the first and five millions each respectively of the last few, in the first dose, the next doses being double that of the previous one given by subcutaneous injection, at an interval of days, were found by some to be effective preventive.

CURATIVE TREATMENT

Rest Immediately the diagnosis is made the patient should strictly be confined to bed. Though at the beginning diagnosis is a matter of impression and probability unless there is an epidemic.

Isolation The patient should be isolated. As the virus is spread by droplets, no one should be allowed to come near the patient except for nursing purposes.

Caution Cases of influenza not uncommonly begin as trivial cold and after the first febrile state, the patient is tempted to go out to work, whereupon he may promptly come down with a recrudescence of the infection coupled with broncho pneumonia. Hence the importance of enforcing strict rest in bed even after the patient has become afebrile for two to three days or more.

Room A room with good ventilation light and if possible adjacent to a bathroom should be chosen for the patient. All the text book writers consider the climate of their own country and thus select the rooms, but in the tropical countries, suitably covered verandahs, adjoining to a both room, and the patient adequately protected from sun and rains is a useful place, because here ventilation is a question of prime importance.

"The room should be as airy as possible and, by preference warmed by a coal fire. A free current of air is probably the most important single point in the whole treatment. If both ventilation and warmth cannot be obtained at the same time then preference should be given to ventilation."²

Isolation "In³ the hospitals a cubical system should be adopted. The patients should be separated by efficient screens or sheets. It seems criminal to permit one patient who may be suffering from streptococcal pneumonia to cough in the face of another patient across a short space between the beds."

Dry sleeping of floor is not permissible but only should be scrubbed by water containing sufficient bleaching powder or phenol or cresol in it.

Bed This should be as in typhoid fever.

² Lord Horder (1936) Influenza p 2 Treatment in General Practice Lewis, London

³ Meats, (1921) Treatment of acute infectious diseases p 210

Doctor and the nurse, should protect themselves from the sources of infection Though linen masks are not adequate protection yet one should try not to be a contact carrier of the disease to the next patient This is a very important consideration for the doctor in all these infectious diseases

The mask must be of suitable mesh and thickness, large enough to cover mouth and nose with a good spare margin To the four corners tapes are to be attached to tie behind the head Several of these may be used in the course of the visit, and each mask is left after a visit to be destroyed by fire The hands should be cleansed by soap and water Gargling of the throat by one in hundred mercurio-chrome solution may be useful

As soon as the doctor shows any symptoms of cold he should desist from his visits and treat himself and remain isolated preferably in bed, keep himself warm, conserve strength and energy

Nurse The nurse should also take the above precautions Here it should be emphasised that the above rigid protective measures for the doctor, attendants and the nurse are more incumbent in an epidemic of influenza spreading like wild fire

For sporadic influenza, which is not so infective, the above measures may not be followed up rigidly, but the principles may generally be adhered to, with advantage

Eyes, Nose etc The eyes should be regularly cleansed by warm water, and boric acid solution four to ten percent, or sixteen to forty grs to an ounce of aqua distil When there is much dryness, chemically pure liquid paraffin may have to be dropped into the eyes Nose when dry or when congested the oily preparations as used in rhinitis should be used

Secretions The secretions and discharges of the nose and mouth are highly infective and should be caught in linen and burnt down each time Dishes, utensils, bed linen should also be disinfected properly

Bowels The bowels should be opened at the beginning as tonsillitis For children castor oil in two to four drams may be useful Later in the disease, enema should be the method of choice for moving the bowels, because purgatives at this stage may exhaust the patient unduly

Bedpans Bedpans should always be insisted upon because the conservation of energy from the very beginning is of help and is a prudent procedure

Skin, sponges, etc Care of the skin, should be as strict as in cases of typhoid fever Bed clothes need be carefully chosen, and the patient should not be overburdened with quilts etc Even when

the patient feels cold and chilly, a few hot water bottles and hot drinks like tea, or milk or soup may be given. The drenching perspiration should always be attended to.

High temperature The discomfort of high temperature is very suitably mitigated by tepid sponging, ice cradles, cool water or alcohol sponging.

Diet Diet should be restricted to warm liquids, preferably every one and a half to two hourly during the day and every three to four hourly by night, provided the patient is awake. On no account the patient should be roused from sleep either for feeding or for taking the temperature or for medication. 'Feeding up' is not to be encouraged and the desire of the patient for food and his likes, habits should receive due consideration.

Fruitless Cough, should be prevented by a prescription like the following

Syrup Codeine Phosph	m	40
Syrup Pruni serotinae	m	60
Tr Camphor Co	m	15
Syrup Tolu	m	60
Aqua	ad fl oz	1/4

One dose, when the cough is very troublesome. When the cough is intractable and causes loss of sleep, one can prescribe the following

Ammon bromide	gr	15
Syrup chloral hydrate	m	60
Bromoform	m	10
Aqua glycyrrhizae	ad fl oz	1/4

one dose every three hours in insomnia

In very intractable cases of cough, morphine in $\frac{1}{6}$ gr with atropine $\frac{1}{200}$ gr may be given to an adult, subcutaneously, specially at the early sthenic stage

Insomnia Loss of sleep is fatiguing and these cases ultimately do badly. For this purpose revision of general measures such as proper ventilation of the room, hydrotherapy, suitable diet, and assurance to the patient may be of comfort. Relief of the toxæmia and nervousness may go a great deal to combat the insomnia.

Paraldehyde —in drachm doses with tinctures of quillare and aurenti twenty minimis each to cover the taste may be ordered when the insomnia is refractory to bromides.

A mixture of ammon bromide gr twenty with one drachm of syrup chloral an hour before bed time is often effective. At the early stage barbiturates may be given in small doses, but later on, they should preferably be withheld.

Gastritis and Vomiting In some cases, specially in certain epidemics gastric symptoms are more common than in others. At the first appearance of these, all food should be stopped for the time being atleast, only sips of water being allowed. A carminative mixture like the following one may be found effective —

Sodii bicarbonate	gr	10
Sodii sulpho carbolate	gr	6
Liq calcis saccharatus	m	90
Liq bismuth	m	60
Syrup Aurenti	m	60
Aqua chloroformi	ad fl oz	1/4

one dose every four to six hours

When the vomiting is troublesome and is not relieved by the

ordinary methods other measures adopted to stop it as indicated in cholera should be taken recourse to.

Recently Schwanke (1936)⁴ described four cases in women who complained of bitter taste in the mouth following influenza. It had no relation to the severity of the original attack.

Circulation In old or debilitated persons specially when they are used to alcohol brands in two dram to half an ounce, every four hours may be given with advantage, notably with a weak heart and circulation. It is better given alone. Veritol may be of use.

Strychnine —In 1/16 to 1/32 gr doses every eight to twelve hours by subcutaneous injection or 1/16 gr or Coramine, in one to two c em orally or 17 c em subcutaneously every eight hours are useful as cardiorespiratory stimulant. Strychnine is one of the best drugs for stimulation of the respiratory center in cases of respiratory troubles.

Adrenalin or Adrephrine in 1 c em given intramuscularly every four to eight hourly is of service. Adrenalin acts through the vasomotor system. This though a fine stimulant yet is very short lasting in effect, adrephrine has the special advantage of containing some ephedrine in addition, and it sustains the quick action of adrenalin.

When the pulse rate is quick say above hundred and twenty per minute or where circulatory insufficiency is noticed strophanthin 1/250 gr per vein with glucose twenty five per cent twenty c em every six to eight hourly may be useful.

Strophanthin one c em intramuscularly has got almost the same action as intravenous strophanthin. Given every eight hourly it is of use.

When the circulatory failure is very marked one c em give twenty five per cent glucose solution fifty c em every six hourly with six units of insulin subcutaneously.

Calcium in the form of calcium gluconate may be given when there is indication.

Convalescent Serum —Convalescent serum tried during the pandemic of 1918 appeared to be of doubtful efficacy.

Complications like pulmonary edema, exanostis dyspnoea, pleurisy and emphysema, otitis media, pneumonia etc., should be treated properly. Meningitis⁵, when of influenzal origin, should be treated by repeated lumber punctures, and other measures discussed under that condition.

⁴ Klin Woch 1936 15 p1.

⁵ Spektor, (1930) Amer Jour Jour Dis Child n 1930.

Convalescence —

Undue weakness is common following influenza, hence convalescence should be carefully watched. There is often a tendency on the part of the patient to resume work as soon as possible, and also for reasons of economy the doctor's aid is quickly dispensed with. The doctor too often in his hurry, becomes unappreciative of the importance of extra rest during this period.

Even those cases which do not cause much concern during the active stage of the disease, need be watched⁶ carefully. According to all experienced workers at least *four days* complete rest should be given after the patient has become completely afebrile. In cases where the duration of illness has been for more than seven days, this period of rest should preferably be spent in the recumbent posture. If the pulse rate gets unduly slow or quick after leaving the bed, question of further rest should be seriously considered.

The function of individual organs of the body namely *the heart, lungs, nervous system, kidneys* should be frequently watched and examined, say *every fortnightly*, to investigate their integrity, and the needful should be done if any one is found defective.

The diet should receive special attention. Its quality and quantity should be improved according to the taste, liking and digestibility of the patient.

Daily diet should include egg, milk, butter, some fresh fruits, wholemeal bread with meat at night, and others.

Easton's syrup, ferradol, syrup minadex may be used in convalescence with advantage.

Exertion should be done in moderation and over exertion, worry, etc should be avoided. Lastly if the patient feels unusually weak, not only work should be very much limited, but the question of change to a better climate should be seriously considered and whenever possible given effect to.

CHAPTER XII

WHOOPING COUGH

(Pertussis)

Age, Sex The greatest predisposition is from six months to five years of age and over onehalf the cases occur during the first two years of life. Girls appear to be more susceptible than boys. Children rendered weak have got greater susceptibility. The organism *haemophilus pertussis* spreads by droplet infection as do other infections of the nasorespiratory tract.

Catarrhal Stage When an infant or a child of any age develops symptoms of catarrhal infection with headache pains and aches cough worse at night and there is no history of any previous attack but that of an exposure to infection of whooping cough one may suspect the disease. But it can be diagnosed at this stage either by the isolation of the organisms through culture of the throat swab or when the characteristic paroxysmal cough commonly known as the whoop has developed. This stage may last for a few days to a few weeks.

Paroxysmal Stage The fever and the catarrhal symptoms disappear the cough tends to be typically paroxysmal and the characteristic whoop is heard after each bout of cough. In irritation cold wind excitement anxiety fear precipitates these attacks and the child generally feels when it is coming. She runs to the mother or nurse or grasps the nearest object for support in their absence tries to grasp her legs near the knees to brace the body for the approaching attack. She becomes red and congested in the face the veins stand out prominently on the neck cyanosis appears the tongue comes out in a spoonshaped manner all the accessory muscles of respiration are brought into play and the severe explosions of barking cough are followed by a long drawn inspiratory sound known as the whoop. Generally the patient vomits after each attack. Each paroxysm lasts from a few seconds to a few minutes. Usually twenty to thirty paroxysms occur a day in an average case though there is record of one hundred and twenty paroxysms in twenty four hours in a three years old child. This stage generally lasts for a month to six weeks to be followed by a decline in the disease.

Complications During severe paroxysms not only subconjunctival but also cerebral hemorrhage, involuntary passage of urine and faeces may take place. Hemorrhage may take place from recent scars or any ulcer or naevus present in patient. At autopsy hemorrhage has been encountered in the cerebrum kidney adrenals and other organs.

Respiratory System It is more or less involved bronchitis and bronchopneumonia are common. Subsequent tuberculous infection is not unknown but not so common as is supposed.¹

Diarrhoea and catarrhal states of the intestines are frequent.

Nervous system. is variously involved. There may be delirium hallucination depression of spirits convulsive attacks paralysis of various types and degrees. Deafness and blindness may occur too.

1 Osler's Modern Medicine, Vol 1 Ruhrah (1925) p 625 Lea and Febiger Philadelphia A. Y.

2 Tumbler and Raus (1936) Monde Med 46 p 20

Blood There is almost invariably a leukocytosis³ varying from fifteen to twenty five thousand, of which about fifty to seventy per cent may consist of the lymphocytes and such a blood picture is highly suggestive, when the clinical picture is significant. But recently⁴ Braschi (1933) reports twelve cases in which there was very little leukocytosis.

Culture. Suitably prepared Petri's dishes containing special media favourable for the growth of *haemophilus pertussis* exposed for nearly fifteen—seconds at a distance of about five inches from the mouth of the patient, during a paroxysm of natural cough and incubated for seventy two hours may show the typical colonies of the organism. During the catarrhal stage about seventy five per cent of the cases may afford a positive cultural result. But a negative report does not exclude possibility of whooping cough, if the clinical picture is suggestive of it.

Atypical Cases There are numerous cases of undoubtedly whooping cough, in young adults⁵ or in the elderly persons or even in children who may not show the typical whoop. But the characteristic persistent paroxysmal cough, the typical blood picture and lastly a positive bacteriological cultural finding clinch the diagnosis.

Cough caused by enlarged tracheo bronchial glands The cough due to enlarged tracheal or bronchial glands is distinguished from whooping cough by its non-contiguous character and is usually afebrile the typical blood count is lacking. There is not that paroxysmal cough of prolonged periods no whoop expectoration and vomiting. It is generally chronic and does not tend to disappear skiagram may show the glands. Asthma like attacks may occur in this enlargement of the glands.

Whooping cough may easily be distinguished from asthmatic fits, laryngismus stridulus foreign bodies in the trachea and so on.

TREATMENT

Prophylaxis The child should be isolated for six weeks from onset and if any other young person has got to occupy the same room where the patient once lived, it should preferably be disinfected and kept unoccupied, having all the doors and windows opened up and sun's rays being allowed to have a full access for a few days. Children with other diseases due to lowered resistance may get easily infected, hence should be carefully protected. The period of infectivity lasts until the spasmodic stage is over, though the most infective is the early catarrhal phase. Most of the deaths in whooping cough are during the first three years of life, hence younger children should always be protected from unnecessary exposure to infection.

Vaccines Four subcutaneous injections of about four, eight, twelve and sixteen thousand millions of bacilli, *haemophilus pertussis* at an interval of about four to six days, according to reaction, often act to the extent of causing a very mild infection. Complete

³and Neuns (1937) Lancet, July 1st p 251
⁴(1933) Pediatra, 13 p 300
⁵(1934) Jour of Pediat, p 576

In cases of repeated vomiting, the stomach of the patient may advantageously be washed by asking her to drink a cupful of warm water with a pinch of soda bicarbonate in it. In a few minutes the patient will vomit it out and thus the stomach gets automatically washed. In bigger children one glassful of warm alkaline water may be given to be drunk for this purpose. This lavage of the stomach may have to be done twice a day in bad cases of repeated and persistent vomiting. The alkaline stomach wash is likely to excite subsequent increased flow of the gastric juice.

Rectal saline. When no food can be retained, rectal saline with five percent glucose, by the Murphy's drip method, given high up with a catheter, may be useful. But repeated paroxysms of cough often stand on the way of giving this. In such cases subcutaneous or intravenous saline with glucose solution varying from ten to twenty-five percent, in eight ounces to a pint, once or twice a day, according to indication, may be the means of saving the patient's life during the most serious and active period of the disease. Dehydration in younger patients is an urgent matter which should always receive our prompt and pointed attention.

Drugs. There have been so many drugs advocated that one seriously doubts, if any one of them is of real service.

Some of the drugs in vogue are —

Belladonna due to antispasmodic action, does some good and has got to be pushed till symptoms of mild poisoning, such as dilatation of the pupils, dryness of mouth, flushing etc., appear. For children two minims of the tincture with one grain of sodium bromide every three hourly may do some good. But in most cases bigger doses of the tincture are required.

Intipyrin and Sodium Benzoate, half to one gr. of the former with two grains of the latter and 1/6 grain of luminal may be tried specially at night and evening to ensure rest and sleep, besides they have soothing effect on the paroxysms.

Phenacetone, in half to one grain, tincture opii camphorata in two to ten minims, according to age, every four hourly are old, but new remedies

Bromoform, in two to four drops plus as many drops as the age of the patient in years three to four times a day, hence the maximum that can be given with advantage to a case of three years, is seven drops, three times a day.

Benzil Benzoate, a twenty percent alcoholic solution of this in ten to twenty minim doses thrice daily is of use.

A prescription like the following may be useful for a child of two to three years, one dose to be taken four times a day as directed

Tincture opii camphorata	m	4
Tincture ephedra vulgaris	m	5
Tincture belladonna	m	2
Bromoform	m	4
Benzyl benzoate (25% alcoholic)	m	10
Potassium bromide	gr	2
Syrup tolu	ad fl oz	1.

two teaspoonfuls four times a day

Antipyrin	gr	1
Phenazone	gr	1/2
Ephedrine hydrochloride	gr	1/8
Luminal	gr	3/8
Ext belladonna sicum	gr	1/16
Sugar of milk	ad gr	4

one powder every six hourly for rest and to promote sleep

Gold Tribromide,⁸ in 1/20 to 1/10 gr thrice daily after meals and once at night. In three to four days cough becomes less frequent, shorter and milder, and it subsides in three weeks in two-third of the cases. Recently Epstein⁹ (1916) has recorded his observations on three hundred cases treated with gold tribromide in the form of an elixir known as elixir bromaurate. The results are definitely in favour of this treatment.

Ephedrine Hydrochloride.—In children above one year of age 1/4 gr twice a day, morning and evening, or 1/8 gr for younger children is being advocated recently. But some children show restlessness, abdominal distension and sweating when treated by this medicine. Under these circumstances treatment by it is contraindicated.

Sedatives. One or several of the following sedatives, given four hourly, may be of use. The common doses of these remedies when given singly are, syrup cocaine phosphate, five to ten drops, Dover's powder half a gr, two grains each of chloral hydrate and potassium bromide. In younger children preparations containing opium should always be given with caution.

Ether. Intramuscular injections of ether half a c cm every third day, till two such are given, next, i.e., third dose, one c cm increased in the fourth to 1.5 c cm and up to two c cm may be given into the gluteus muscle every fifth day. But there is a risk of necrosis, and hence is better avoided.

⁸ Medical Annual (1914) p. 491

⁹ Arch. of Pediat. (1916) 53 p. 82

ETHER AND OLIVE OIL.

Equal parts of olive oil and ether mixed very intimately may be given slowly, high up rectally through a catheter of number eighteen or twenty, by gravity action. Dose is, one dram per year of age of the patient. If the subject is under one year, a mixture of twenty five per cent ether and seventy five percent olive oil, in the above doses, has got to be substituted for half and half mixture advocated for children above one year of age. If defecation takes place in half an hour's time, one may have to repeat the rectal medication. In all bad cases this is worth trying.

Thyroid and Suprarenal—Small doses of dried extract of thyroid and suprarenal glands, say one eighth gr. of the former and one fourth gr. of the latter, every six hourly may be of use.

Vaccination—If the patient is not already vaccinated against small pox, she should be submitted to it as soon as possible. Not uncommonly this cuts short or ameliorates the symptoms of whooping cough.

Vaccines. There has been very conflicting results published by various workers, on the efficacy of curative vaccine therapy. Begg and Coverey¹⁰ (1936) report no demonstrable efficacy from vaccine therapy. Whereas Stallings and Nichollas¹¹ (1934) treated two hundred and thirty one cases in the catarrhal and paroxysmal stage of whooping cough with an undenatured pertussis antigen in doses ranging from one to half c cm daily until the symptoms got better. Abatement of the symptoms, according to them, followed within a week in seventy eight percent and within two weeks in fourteen percent, and in eight percent they persisted over two weeks.

But in practice we find the vaccine to be of some use in majority of the cases, specially when given early. But the *a erage vaccine is absolutely useless*. In order to be effective the vaccine has got to be made from recently cultured, freshly isolated strains grown in suitable blood media. For this purpose the whooping cough or Pertussis vaccine (P & D) is of good use. The Glaxo's soluble vaccines are worth a trial too. The vaccine to be of use must not only be polyvalent *in haemophilus pertussis*, but should also contain *micrococcus catarrhalis*, *bacillus friedlander*, *staphylococcus*, *influenza bacilli* etc. This combination of mixed organisms appears of use, specially when the acute stage of the disease is over.

Serum. Convalescent whooping cough serum in five to ten c cm intramuscularly on two successive days, or about twenty c cm of convalescent whole blood, given as above, in two daily intramuscular injections in the gluteus, appears to be of benefit.

One has injected young mother's blood ten to twenty c cm daily till two to four injections were given with favourable results. It is

• 10 Lancet (1936)—i p 82

• 11 Amer Jour Dis Child (1934) 48 p 1183

worth while trying. This treatment may be given at any stage of the disease. Gironcoli (1934) after his disappointment in vaccine therapy treated twenty severe cases in children varying from twenty five days to thirty months in the paroxysmal stage by one or two *intragluteal injections* of maternal blood with the result that all but three showed rapid improvement. This is a safe procedure which should always be given a trial. We have found one daily injection till two to four such are given, to be more effective than one single haemotherapy.

Ultra violet light About minutes exposure each, of the front and back of the patient's body may reduce the paroxysms by diminishing reflex excitability. How far its general use will be effective in sunny India, one cannot say, though in a few cases this procedure has done apparently some good.

X-ray Exposure According to American workers this therapy is very effective. It appears to act by reducing the size of the mediastinal lymph glands, in those cases where these enlarge and are contributory to the perpetuation of cough.

Water vaporization etc During the dry winter months the patients' cough may be very troublesome. In such cases water vaporised in the room may help in easy expulsion of the phlegm. Inhalation of tr. benzoin co. is also of use.

Rub of the Chest Rubbing of the chest twice a day with a counter irritant like camphorated oil or Viel's vaporub or ozodine with methyl salicylite (I D H) may do some good. In children counter irritants rubbed on the chest act very effectively in the amelioration of this troublesome cough.

The following liniment is suitable as a counter irritant rub of the chest in all cases of lung diseases cough, catarrh and so on. It may be given two to four times a day. For infants it is rather strong and should be diluted with equal amount of olive or mustard oil. For European children it requires dilution always as their skin is delicate.

Oil Eucaliptus	m	60
Menthol	gr	30
Camphora	gr	60
Oil Gaultheria	m	60
Iodine Crystals	gr	10
Soda Bicarb	gr	30
Tr. Capsicum	m	20
Oil Sinaapis	ad fl oz	4

To rub on the chest as directed, after the bottle is well shaken, four times a day.

Treatment of Complications Bronchopneumonia, convulsion, diarrhoea etc require their usual line of treatment.

CHAPTER VIII

MEASLES

(Morbilli)

Diagnosis Commonly met with in children under five years of age mainly in the winter months symptoms appearing from nine to eleven days and rash on the fourteenth day of infection Prodromal rashes history of exposure loss of weight leukocytosis and Koplik's spots may help in the diagnosis before the rash appears

About the ninth and tenth day after infection the child becomes listless and drowsy This drowsiness is such a constant feature as to be regarded by some as almost pathognomonic¹ The appetite is poor or lost The child may complain of headache chilly sensation and a feeling of tiredness Adenitis may be generalised During the invasive state sneezing a dry irritating cough watery eyes and conjunctival injection, are the main extrarrhal signs Photophobia and diarrhoea are not uncommon Sore throat vomiting etc are common too

Rash The rash generally appears on the fourth to sixth day of fever and the symptoms become aggravated along with it The temperature rises upto 104° or 105° F The eruption first appears about the eyebrow, behind and below the ears and round the mouth It rarely appears first on other parts such as buttocks thighs and wrists

It then spreads over the face neck trunk and extremities and is fully out usually in twenty four to forty eight hours time Small brownish maculæ first appear to become papules the next day with a tendency to fuse into small groups with irregular sinuous or crescentic outlines Gradually they become confluent on the face neck back and extensor aspects of the limbs The skin is moist and exhales a peculiar musty odour The rash fades in order of its appearance and disappears in the course of three to four days The brownish stain may persist for some time particularly in the back The tongue is at first heavily coated then red papillæ appear on it A badly eruptions rash, may mean weakness of the heart specially when accompanied by cyanosis

The clinical types Toxic type pulmonary type, hemorrhagic type etc are classified according to the predominance of one or other groups of symptoms

Koplik's Spots Koplik in 1896 pointed out certain spots which now bear his name and are pathognomonic in measles They consist of small irregular areas of a bright red colour and in their centre is noted in strong day light minute bluish white specks They though appear most commonly inside the cheeks opposite the second molar tooth yet may be noted in other places too in the buccal mucosa These spots can be seen in about ninety five per cent of cases but the examination must be made in the bright day light or in a very white light otherwise in the ordinary artificial light they are not visible These are of much help in the diagnosis as they tend to appear generally two to four days before the actual rash is noticeable

¹ Osler's Modern Medicine, (1925) Vol II Measles p 103 Lea Febiger, Publication

Anomalous Cases There may be anomalous cases suggesting other diseases. The patient may complain of extreme headache with photophobia simulating meningitis. Catarrhal symptoms and the bronchitis are at times alarming. Croupy attacks or intense hoarseness with other symptoms sometimes simulate laryngeal diphtheria. Recently many cases with complications of the nervous system are being reported.

Temperature The temperature rises high initially to fall on the second or third day and shoots again high after this temporary fall and it is at the second height of the fever and aggravation of other symptoms that the rash appears from fourth to sixth day of pyrexia more commonly by the latter than by the former date. When the rashes are fully out in two three or even four days time in the absence of complications the temperature tends to fall by the seventh to the tenth day from onset.

Complications. Though virulence of attacks differs to a certain extent, according to the resistance of the child and the virulence of the infection yet about two third of the cases develop some complications the most important ones involving the respiratory system. **Respiratory** Coryza is common and may be even purulent hoarseness of voice croupy cough sometimes loss of voice simulate laryngeal diphtheria. Tracheitis bronchitis or more serious broncho pneumonia with all its associated troubles may appear. The course of this complication may extend even upto six weeks. It is more common in the weak and debilitated than in the strong. Over-crowding bad management of the case unsuitable diet bad health etc all predispose to broncho pneumonia. **Eye** Photophobia conjunctivitis corneal inflammation etc are common. I have seen punctiform opacity of cornea developing after an attack of measles. **Ear** Otitis media is not infrequent. **Gastro Intestinal** Stomatitis of some degree is almost always present usually catarrhal but may be ulcerative and even of gangrenous form. Colitis diarrhoea etc are also common. **Circulation** Endocarditis and myocarditis may cause death. **Skin & Nervous system** are affected in various ways due to complications^{2,3}. Resistance to tuberculosis is much lowered by an attack of measles.

- Differentiation has got to be made from other eruptive fevers

Mortality, is very high in the infants upto six months though fortunately they are not frequently attacked. Deaths are higher in the winter than in the summer. Most of the deaths are caused through complications. It is higher in the debilitated, under nourished rickety children.

TREATMENT

Prophylaxis etc A case of measles is very infective from the onset of fever to the eruptive stage. With the fading of the rash the infectivity diminishes. The fomites should be disinfected properly, and the patient and contacts strictly isolated. There is not much evidence to show that the room, once occupied by a measles case, remains infected provided the doors and windows have been kept open for a few days and the infected furniture, clothes etc, suitably disinfected.

² Block, (1935) These de Paris No 800

³ Norman, (1936) Lancet, ii 684

Protection by Convalescent Serum Gunn (1932)⁴ gave from five to twelve c cm of convalescent serum with good results. This dosage depends upon the age, state of health and interval after exposure and other factors. To be effective, the serum should be given within five days of the exposure to infection. If convalescent serum is not available, whole blood of young persons who had measles once may be given intramuscularly into the buttocks in twenty-five c cms. Gunn⁵ (1932) has found this almost as useful as convalescent serum. Placental extract in ten to twenty c cm doses has both definite curative and prophylactic value^{6,7}.

Room etc. The room should be large and airy, well ventilated, and devoid of all extra furniture etc. As not uncommonly photophobia and the phobia of catching cold condemn the patient to darkness and to a room deprived of fresh air, the importance of these natural curative agencies should be impressed on the mother and the attendants. Light is a potent ally in combating infection and keeping the patient cheerful. Open air is one of the best preventives of complications. If there is much photophobia, the room should be shaded without interfering with free ventilation. Suitably tinted eye glasses may also be advantageously used. Moist air is better in dry weather hence steam kettles for vaporising tincture benzoin etc may be useful. This may allay cough by making the air humid.

Bed, Clothing etc. The bed should be of suitable height, width, and the mattress of not too soft a material. Children having measles should be kept with a safe air space between them, preferably in separate rooms, as this prevents the spread of superimposed infections grafted on individuals. Draught should be avoided. Contrary to the lay idea, the measles patient does seldom catch a chill during the pyrexial phase of the illness and hence on the mother should be impressed, that it is unnecessary to wrap the child tightly in blankets or bed clothes. In the cold weather and if the room temperature is very low, a loose woolen vest or a over clothing may be worn with advantage and comfort.

GENERAL MEASURES

The nurse or the attendant or the mother should also keep aloof from other susceptibles. It is better that they should be healthy and free from streptococci of the haemolytic type, which some people harbour in the upper respiratory passages. Any person with catarrhal is dangerous to these ill children hence the best plan for the attendant is to wear a mask while looking after them. Visitors with cold or

⁴ Gunn (1932) Brit Med Jour 1 143

⁵ Gunn (1932) Lancet 1 p 675

⁶ Karelitz Greenwall and Klein (1937) Jour of Pediat 10 p 170

⁷ Levitus, (1916) Jour Amer Med Assoc 105 p 493

catarrh may transmit this apparently trivial infection to patients of measles with lowered resistance, not uncommonly with disastrous results

Sponging etc The daily warm routine sponging should always be insisted on. If there is insomnia, restlessness or cardio circulatory weakness, every four to six or eight hourly sponging with tepid water and the washing of the head with cold water, specially when the temperature of the patient is above 102°F, is of use, notably in most highly prevalent cases.

Mouth, ear etc The mouth should be cleansed after each feed, by either horo glycerine or any other suitable mouth wash. The nose and ear should also receive due attention. If there is much sore throat or cough or tonsillitis the risk of otitis media is real, and some efficacious ear drop should be used every twelve hours. Special care should be taken to plug the ears by cotton wool while sponging or giving bath to the patient.

Mouth A warm sodium bicarbonate solution twenty grains to an ounce of water may be used to cleanse the mouth after each feed, by finger wrapped with lint or cloth soaked in the above solution. In young or refractory children if there is any risk of injuring the delicate buccal mucous membranes, this procedure of cleaning should be replaced by only ordinary mouth washes. Gargling is not generally possible to be done by these young patients.

Stomatitis It may prove very serious in these not uncommonly debilitated children, hence it is better prevented. A mixture containing the following, may do some good by preventing or curing it.

Pot Chlorate	gr	1
Acid Hydrochlor dul	m	2
Ayrup Aurenti	ad	m 60

one teaspoonful every four hourly as directed

Fissures round or at the angle of the mouth are best treated by covering it by horosaline or by equal amounts of unguentum hydrat ammoniat and vaseline

Nose Cleaning and keeping up of the local resistance of the upper respiratory passages in good order are of prime importance to prevent not only septic complications but also broncho pneumonia. To keep the anterior nares clean, a warm alkaline saline may prove useful. If there is too much of a tendency towards crust formation, liquid paraffin with a grain or two of menthol in it may be utilised as an emollient application. Nasal douches are seldom required. When used the flow should be only by gravity method and not by force and given twice a day. The solution generally used contains sodium

bicarbonate, chloride and borate, in two grain doses each in an ounce of distilled water. This solution at body temperature may be sniffed up through the nose by the older children. For infants an ordinary dropper may be used for this washing of the nose, the patient lying on his back. When both the nostrils are washed he coughs and throws the materials out, thus washing the back of the throat as well. Too much hard blowing of the nose is not advisable, as it tends to drive infected material through the middle ears, causing otitis media.

Eyes Some degree of conjunctivitis is almost invariable. Milder cases only require the application of borovaseline to the eyelids at night or the dropping into the eyes of one or two minims of liquid paraffin. If moderate inflammation starts, an one per cent boric acid solution should be used to irrigate the eyes, as frequently as the severity of the symptoms suggest. In bad cases a four to eight per cent solution of protargol or argyrol may have to be dropped into the eyes every two to six hourly.

Bowels If seen early and the patient is in the sthenic condition free evacuation should be ensured either by castor oil in one to two drachms for younger children and infants. Whereas hydrog subchloride in one eighth to one fourth grain doses every fifteen minutes to half an hour in the evening, till one grain is taken by bigger children, followed in the morning either by Seidlitz powder or I psom salt or sodium phosphate in two to four drachms may be of use. In the later, asthenic stages enema, suppositories are advisable. Puls glycyrrhizae co half a drachm, in warm milk may ensure mild action of the bowels. Clinically there appears better result in treatment, if the patient's bowels move at least once on alternate days.

Diet As some degree of gastro-intestinal catarrh is very common the diet should be regulated accordingly. Anything which tends to upset the digestive tract may help to flare up a mild or trivial infection, into a severe type of entero colitis. In the absence of any complications of the gastro intestinal system, three to four hourly feed of suitable quantity and quality of milk, depending upon the weight tolerance habit and nature of appetite and digestion may be given. In between these feeds plenty of cool or tepid water according to liking may be given. Demand for water may conveniently be met by alternate drinks of plain water and four to five per cent glucose drink in normal saline, made slightly acid by lemon juice. Children often acquire a distaste for plain or skimmed milk or its modifications during illness, but if flavoured with small quantities of tea or cocoa, they often like to take them. But where possible, Horlick's malted milk, or milk flavoured with ovaltine or vitavose or one of the numerous agents used for flavouring, may be given in very small amounts just to cover up the smell of milk. As soups, meat extracts,

may evoke diarrhoea, they are better avoided specially during the first week. If pure or diluted milk is not properly tolerated as shown by diarrhoea or appearance of curds, the milk may have to be peptonised or citrated. In bad cases whey or albumen water may have to be given for twenty four to forty-eight hours to stop the diarrhoea or flatulence, caused either by too much of sugar or fat in the diet. Fruit juice, barley water, green cocoanut water, are also suitable when judiciously given. With suitable additions, alterations and modifications the diet may be so regulated that the patient does not give any trouble over the feeds. During convalescence a vitaminous tonic like, ferradol or syrup minadex, specially rich in vitamin, A and D may have to be continued in order to keep up the resistance of the patient, and thus prevent supervention of other infections on a system rendered weak through an attack of measles.

Drugs Numerous drugs have come and gone in its treatment. Lately the American and Continental workers had been advocating amidopyrin, in one grain doses per year of age upto three four grains, every six to twelve hourly till the fever came down. But since we know of the serious agranulocytosis produced by amido pyrin all cautious physicians have given up its use.

Sera If the patient is seen early within the first two three days and the diagnosis is made, either convalescent or healthy serum or whole blood⁸ may be tried in twenty to fifty c cm doses, in two to three successive days intramuscularly, into the buttocks. One injection of twenty to forty c cm of convalescent serum, given early may not only modifies⁹ the course of the disease, but definitely prevents complications from developing. In one of our cases convalescent serum saved a young child from severe broncho-pneumonia complicating measles.

But as most of the patients come under our care at the later stages, when the system is immune to the virus, this specific method of treatment may do no good. The coming out of the rashes, may mean a systemic dissemination of the virus and a stimulus to general immunity, hence in such a body a few c cm of anti serum however potent is not likely to produce much benefit. But as a measure of prophylaxis this therapy is of distinct use. Recently injections of two c cm of extract of placenta were used with success, as preventive, and five c cm as curative of measles. Whatever the theoretical considerations may be, in actual practice convalescent whole blood in fifteen to twenty c cm, or convalescent serum in ten c cm doses intramuscularly and particularly when repeated daily for two to three

⁸ Knauer (1929) Jahrb f Kinderheilk 123 p 296

⁹ Debré and Ravina, (1923) Bull Soc Med Hop 47 p 220

days is of distinct use therapeutically, as well as prophylactically and is always worth the trial.

Antistreptococcus Serum For these late cases potent antistreptococcus serum, preferably polyvalent scarlatinal anti toxin¹⁰ in twenty to forty c cm doses may help by preventing the development of such complications, as faecal angina, stomatitis, laryngitis and even a broncho pneumonia. Probably convalescent serum or healthy whole blood from young persons who suffered from measles in the younger days may have the above beneficial effects. For this purpose the blood of the mother may be suitable for the child, as the former is likely to have developed some antibody, due to close and intimate contact with her sick child. I have used young mothers' blood intramuscularly in twenty c cm doses apparently with good results.

Vitamins The custom of giving vitamins A, C and D from the very beginning of the infection, though may not show any marked beneficial results for cases whose diet is not lacking in them, but they certainly are additional forces for an adequate defensive fight in the later stages of the disease. On the few cases that one has tried this method of vitaminous diet from the beginning of infection there seems to be lesser of the complications.

COMPLICATIONS AND THEIR PREVENTION AND MANAGEMENT IN SHORT

Respiratory The commonest is broncho pneumonia. Development of this condition changes the outlook of the case for the worse. Mortality is very high in the first two years of life. Treatment is the same as discussed in cases of pneumonia and broncho pneumonia.

When diphtheria complicates this disease proper measures as indicated under the chapter on diphtheria are to be adopted. *Otitis Media* Nearly ten per cent of the sufferers from measles are affected by this complication. The ears should be plugged by cotton wool while the child is sponged. They should be kept clean and inspected daily without fail, during each visit. With the first appearance of slightest pain hot fomentation need be applied. A five per cent carbolic acid solution of boroglycerine, with equal parts of rectified spirit, when dropped into the ears every four to eight hours, may prevent its development. It may also act as a curative ear-drop. *Adenitis* This should be treated on general lines. *Gastro-intestinal* With the fading of the rash or in convalescence an entero colitis may occur and is often of serious import. It should be treated as is done under other circumstances. The choice of a judicious diet is of value in preventing this trouble. With the first appearance of symptoms no food should be allowed for twenty four hours or

longer, except water in small quantities and frequently. The diet should consist of barley water, arrowroot water or rice water. Milk diluted with lime water or peptonised may be of use in mild cases. During the beginning of the infection, emulsion of castor oil in half to one dram doses, only once early in the morning to remove the irritating contents of the bowels may be of service. Bowel wash with normal saline at 100°F of one to two pints may be helpful. Vomiting should be treated by withholding all food orally at least for the time being. When the tongue is cleaner, suggesting a more or less clean bowels, the motions may be checked either by trinalbin, in ten to fifteen grains or bismuth subnitrate in ten to twenty grain doses after each feed. Preparations of opium in the form of Dover's powder, in quarter to half grain, with or without bismuth or kaolin, every six hourly may do good, but should never be exhibited unless the gut is clean, the tongue being one of the best guides in ascertaining this. For pains and colic hot fomentation may prove effective. But in refractory cases morphine in one fifteenth to one twenty fifth of a grain with 1/400 gr. of atropine may be the only remedy left to fall back upon. Eyes. Ulcer of the cornea may have to be treated carefully, as this is likely to develop specially in the ill nourished debilitated children. If improperly treated corneal opacity following ulcers, may cause loss of clearness of vision.

Collapse Stimulants are to be used according to indication. Mustard bath made up of one table spoonful of mustard to the gallon of water at about 100°F or warmer, may be helpful in combating the milder forms of collapse. The whole quantity of mustard is made into a thin paste in a small quantity of tepid water, and mixed with the bath water. The child is immersed into the bath upto the neck and warmer water added to raise its temperature upto 105°F. The child is left from five to ten minutes, then quickly dabbed dry and wrapped in a big turkish towel or blanket. Hot water bag at the feet and ice cap on the head, may have to be given after bath if there is hyperpyrexia or continued high temperature.

In cases of collapse specially due to entero colitis good brandy, in twenty to thirty drops, per year of age, given every few hours may be of help. If there is much dehydration due either to bronchopneumonia or enterocolitis, orally one per cent to two per cent saline, with five per cent glucose in it, may be given in sips at frequent intervals. Saline in half to one pint, with twelve and a half per cent glucose solution, may have to be given under the skin on the thighs, in bad cases. Rectal saline, of five per cent glucose in normal saline, in two to three ounces, high up rectally by the Murphy's drip method may be of real service and even may be life saving by combating the dangerous dehydration.

Convalescence Watchful care, good vitaminous iron rich tonic like ferradol or syrup manadex, ultra violet rays, sunny outdoor life in a suitable railing bed placed outside in the open air or verandah may help not only by preventing respiratory complications, but also are of service in hastening up convalescence. Plenty of fruits, milk, butter, eggs, soups may be of use to build up the health of the patient Change to a more bracing climate, may do good.

CHAPTER XIV

SMALL POX

(Variola)

General It is a highly communicable infectious disease the exact causative agent being unknown. Incubation period is about twelve but varies from five to fourteen days. It comes with high fever severe head ache and back-ache suffused conjunctiva etc. The temperature comes down usually from the third to the fifth day, when eruptions appear first on the forehead and on the palmer aspect of the wrist. The distribution is away from the trunk the peripheral parts of the body being mostly affected. The eruptions at first are macular then become papular vesicular pustular and pass on to the stage of crust formation. By about the end of the first or middle of the second week the fever of suppuration starts lasting for about another fortnight or so.

Spread Aerial convection droplets crusts are some of the known means of spread of this disease but there may be other unknown methods of spread. The incidence of this disease is said to be greater around the small pox hospitals than in other part of the city with general population. It is more prevalent in late winter spring and early summer months and the severity of the epidemics varies considerably. Variola Minor¹ is not always a mild disease.

Clinically The appearance of the patient at onset is one of extreme exhaustion and overwhelming toxæmia. Convulsion in children in adults delirium bad dreams splitting headache usually more marked near the forehead and the temples sometimes extending to the whole head are common. Backache of a traditionally severe type was compared to renal colic by Sydenham due to its extra-ordinary severity. But all these tend to disappear with the coming out of the rash. There may be gastro-intestinal symptoms of severe type, the tongue as a rule is foul vomiting is almost invariable. In women menstruation may be earlier than usual and miscarriage is also common in pregnant patients. Before the actual eruption appears there may be several types of prodromal rashes.

The commoner types of the disease are —(1) Small pox without eruption but it confers protection (2) Abortive type suddenly gets checked by the first week (3) Discrete type is the usual form of the disease and occurs in those who are partly protected by primary vaccination (4) Confluent type is not very common. Here the eruptions get matted together this is a serious form of the disease (5) Hemorrhagic type a very serious form of disease and is almost invariably fatal (6) Purpuric type has a stormy onset causing sure death.

Diagnosis. This depends on the history of exposure the vaccinal history of the individual the protection adequate or not through the vaccination.

¹ Bareden (1936) Critical Review of the Clinical Features of 13,000 cases of small pox (Variola Minor) L.C.C. 1936.

cases occurring in the town or locality, the typical onset, and so on. With the out coming of the rash, the peculiar distribution helps in the diagnosis.

The points of differentiation between Small & Chicken Pox

SMALL

CHICKEN

Incubation period,	
usually twelve days,	generally a fortnight
Age.	
No age is exempt,	more common in the young and children
Prodromata	
Severe,	absent or slight
Pains aches etc	
Marked,	none or less
Fever etc.	
Usually high continuous for three days, then goes off for a few days out comes the rash, then again fever of suppuration for about three weeks or so,	usually intermittent
Day of Rash,	
3rd to 5th day, is usually fully out in forty eight hours	eruptions come daily for a few days
Distribution of Rash	
Centrifugal away from the trunk mainly on the extremities etc ,	centripetal or mainly on the trunk
Stages of Eruption,	
macular popular vesicular pustular and crusting stages	vesicles from the beginning
Uniformity	
In shape and size they are more or less uniform,	not generally uniform as the rashes come irregularly in daily crops for several days
Umbilication,	
is common	no umbilication, contains usually clear fluid
Crenation,	
no crenation at the edges of the pox,	margins of the vesicle are crenated
Severe complications & sequelæ,	
are common,	rare or very few
Eruptions	
cause pitting	pitting slight or none

Treatment of Chicken Pox requires management and prevention, in the lines of small pox. Vaccination does not protect against this disease.

TREATMENT

Prophylaxis The best and the only sure method of prevention is by repeated vaccination. Children from the third to the sixth month should be vaccinated by one point linear mark, not longer than one centimeter. This vaccination, provided the technic is faultless and the lymph fresh, will almost invariably take. The child should be re-vaccinated at the second, fifth, eleventh sixteenth year, then every two years or so. Girls should be revaccinated at sixteenth and twenty-first year, and subsequently at regular intervals of a few years for the rest of their lives. Compulsory vaccination in Germany has helped in banishing this disease from that country. Vaccination by one point at the early months of infancy tends to make post vaccinal encephalitis a rarity. The older the age at primary vaccination the greater is the risk of post vaccinal encephalitis^{2,3,4,5}. The attendants nurses and every one coming in contact with the patient should be protected by vaccination and re-vaccination. As the incubation period of small pox is generally twelve days, and the protection conferred by vaccination usually is complete by the ninth day, so if one gets vaccinated within the first day or even second day of exposure he is as a rule protected without any infection. This is not likely to be the case if vaccinated later than the second day. The fomitis, clothes etc., require proper disposal and disinfection.

CURATIVE TREATMENT One wonders why the public cherish an idea that our modern scientific methods of treatment are not satisfactory for the treatment of this disease. It is all the more surprising, that there is hardly any reason for this impression. Our method of treatment, is as good, if not better than the much favoured indigenous system.

Hospitalisation is better Owing to the difficulty in obtaining proper isolation and nursing facilities in an average private house it becomes incumbent to remove the patient to a special hospital which should better be situated at the out skirts of the city or away from human habitation.

Selection of the room etc In cases where the patient can not be removed from home, a large airy room, preferably at the top floor, isolated, where possible, stripped of all hangings and furniture, should be chosen. The attendants as said before should all be protected by revaccination. The patient should have as much of fresh air as

2 Taccone (1936) Athena 5 p 67

3 Banerjea (1937) Ind Jour Pediat 4 p 91

4 Bull off internat d Hyg publ (1935) 27 p 287 and p 513

5 Ibid, (1936) 28 p 472

possible, and should rest in bed all the while, till the crusts have fallen away. This as a rule means three to four weeks in an average case without any complication.

General Measures In the treatment of other diseases the nurse may be a luxury, but in this infection the nurse is indispensable if the patient has got to be made at all comfortable at the earlier period, later for safeguarding the eyes, and preventing complications from developing. Open air, plenty of water, good care of the skin affected by thousands of painful eruptions, should be ensured at all costs.

Injection of Liver Extract Intragluteal injections of some good brand of liver extract in five c.c.m. for four to five days, followed by two c.c.m. daily for another two to three days, often modify the disease, if given sufficiently early, shorten its duration, abort the eruptions and prevent subsequent hideous scars and pits.⁵ Personally one has tried this line of treatment in five cases with encouraging results. It is worth while trying in all cases, specially when diagnosed early. But it must be clearly emphasised that any measure proving highly successful in one epidemic may prove futile in another. Convalescent or immune animal sera, are of doubtful efficacy.⁶ Some workers used *electrargol* injections with success.

Pains and aches For the initial headache and pain all over the body, a warm tub bath is probably most soothing. Cool or tepid sponging followed by an ice cap on the head may be of relief. The pain and soreness of the stage of suppuration are also very well relieved by warm alkaline tub bath. As regards medicines, phenacetin in two grains, or the veramon group in five to seven grains, in bad and unbearable cases morphine and atropine may have to be injected according to indication. Chloral hydrate and bromide in fifteen grains each, may be soothing to the irritable nervous system.

Head It is preferable that the head of the patient should be shaved off specially in women with long hair. This not only saves a lot of subsequent troubles but probably also gives better growth of hair later on.

Mouth etc The teeth, mouth, ear, nose, throat require the same scrupulous care and cleanliness, as in cases of typhoid fever. For cervical adenitis local application either of ice or warmth may be of relief. Ice may be given in small bits to suck, and the febrile patient

The nails should always be kept short and clean. For the itching of the skin alkaline warm bath or touching the parts with one in fifty carbolic in oil may be soothing. During the later stages of the disease there is a foul emanation from the skin for this and also to prevent itching and other troubles an oil of the following composition applied liberally all over the skin may be of considerable relief

Menthol	}	one dram each
Thymol		
Acid boric		
Acid salicylic		
Oil eucalyptus		
Liquor calcis		
Olive oil		ad fl oz 16

This oil may be used with advantage from the stage of suppuration and subsequently. It not only prevents subsequent scar and pits but also relieves itching and reduces the stink. The crusts when kept soaked with this oil, can not fly about and be sources of danger to others. As a matter of fact, it is by using an oil of the above type, that the indigenous specialists in the treatment of small pox have acquired their great reputation. On an experience of nearly one thousand cases treated in the special small-pox hospital in the Campbell Medical School, Calcutta, one has been much impressed with the efficacy of liberal use of such an oily application.

For the face Numerous remedies for local application on the face have been advocated and a two per cent carbolic acid solution in glycerine, may be used with advantage for the face. If the face is kept liberally moistened with some oily dressing, scars are neither so disfiguring nor so deep.

Dusting Powder, of equal parts of boric acid and zinc oxide with about one eighth its quantity of iodoform, has been advocated by some, but this appears inferior to the oily dressing suggested already.

Snipping off When the pocks have reached the pustular stage, they may be snipped off with a pair of curved scissors, all aseptic precautions being taken, followed by warm boric or saturated magnesium sulphite compress, with gratifying results. But this is only possible for private cases. In the big hospital wards this is not practicable.

Touching with Permanganate solution Touching the macules with saturated watery solution of potassium permanganate, twice or thrice a day has been recommended, and appears useful. Later on touching only once daily may be enough.

The care of the eyes The eyes should be looked after with considerable care and alertness, as only one eruption, or even careless

handling without any eruption, may prove damaging. They should be bathed in warm boric lotion, or some such weak antiseptic several times a day. To prevent the eye lids from getting stuck together, one may use liquid paraffin, after each antiseptic wash. In the presence of profuse discharge from the conjunctiva, application of sticks of silver nitrate to the conjunctival margins is generally useful. When corneal ulcer has developed, an ointment like the following may be used with some advantage:

Unguentum hydrargyri oxid flavi gr	4
Atropine Sulphat	gr 2
Paraffinum Mollis	ad oz $\frac{1}{4}$

to be applied to the eyes twice or thrice daily. Many cases of sloughing out of the cornea take place with total blindness from intense systemic toxæmia. In these eyes half to one per cent solution of methylene blue locally applied may be of some use, as preventive and curative of small ulcers on the cornea. An ophthalmic surgeon may be of considerable help in these matters.

Toxæmia, Delirium etc. Adequate hydrotherapy and warm immersion tub baths with alkalies, say half to one per cent sodium bicarbonate and 0.2 per cent carbolic acid in bearably hot bath water, are soothing. Ice cap on the head following each bath may relieve the delirium. Enough of water should be given to ensure about normal quantity of urine, this is of special use in keeping the toxæmia under some check. In the confluent type, during the stage of suppuration the patient is always very toxic, and warm alkaline tub bath has been found by me to be of use. Ice caps on the head day and night may reduce delirium. As regards drugs an ordinary alkaline mixture with ten to twenty grains of bromide or equal quantity of chloral hydrate and bromide may have to be given in excitable delirium. Injection of morphine and atropine may be required in cases, not controlled by the ordinary measures.

Diet and nourishment. Liquids, as advocated under the treatment of other acute febrile diseases such as barley water, green cocoanut-water, fruit juice, glucose solution with lemon juice, butter milk, whey, lemonade and milk, milk and soda, are suitable. Plenty of cold water is soothing to these patients. Ice cream may also be allowed provided it is well tolerated. In bad semiconscious comatose patients besides the above, rum or any other suitable form of alcohol in two to four drams every four hourly may be of help. Glucose orally or intravenously, where possible is to be given and may be of much use.

Later in the disease, as the appetite returns one may give, soft boiled rice with butter and salt or with butter milk, smashed potatoes, bread and milk, puddings, etc. A normal diet is resumed gradually.

and cautiously. During the whole course of the illness, adequacy of all the vitamins should be kept up in diet or through vitamin concentrates.

Hæmorrhagic and purpuric cases are almost invariably fatal in even a few hours to a few days. Some have advocated *intravenous use of iodine solution*, its efficacy is really doubtful.

Collapse etc. These occurring in the course of the disease should be treated according to indication.

Complications They should also be managed in their usual lines as they arise. Abscesses, of the skin are probably the most important of complications.

Sulphаниlamide It would really be of much interest to see the effects of these groups of drugs on this disease specially at the stage of suppuration.

CHAPTER XV

RHEUMATIC FEVER

This is an acute specific disease characterised by fever, fleeting painful arthritis rashes peculiar acid sweat and amenability to salicylates with a special tendency to carditis

Subjects of infection, climate etc The disease is uncommon in infants and elderly adolescents and young adults¹ are the most common subjects There appears a certain predisposition in some families Though the primary attack generally begins at young age yet recurrences are not uncommon in advanced years People with fair hair skin and certain peculiarity are said to be more susceptible than dark coloured persons Damp cold countries are favourable places for this disease probably by predisposing to tonsillar affections Great Britain appears to be the worst sufferer from it Damp exposure fatigue tend to precipitate attacks

Source of Infection Tonsillar intestinal upper respiratory passage infection or other infections scarlet fever etc probably serve as the source of the incriminating streptococci (*Streptococcus rheumaticus* of Poynton and Paine²) according to Swift³ and others this condition may be caused by a hypersensitivity to streptococci or their toxin originating from repeated low grade infection or persistence of the foci of infection in the body When under suitable conditions streptococci^{4 5} or their products are disseminated to the tissues the latter over react and the characteristic picture of the disease results Bersaques⁶ thinks that—in rheumatic diathesis an exogenous or endogenous intoxication may help by the development of the symptoms in persons having a peculiar faulty action of the liver

Clinical manifestations

Joints A patient with sore throat tonsillitis or marked constipation or appendicitis or with hidden or apparent sources of sepsis may get a chill or chilly sensation with pain in one or several of the joints such as the knee ankle wrist shoulder hip neck tarsus meta-tarso or meta-carpal phalangeal joint and others By twenty four hours several joints are affected they are painful swollen and red Synovial effusion may appear, notably in the wrists knees and ankles Less commonly affected joints are sternoclavicular vertebral and interphalangeal Fibrous tissues may also suffer and rheumatic nodules are not uncommon in the tendon sheaths and edges of bones etc

1 Mc Sweeny (1931) Arch Dis of childhood London 6 p 313-333 Dec 1931

2 Poynton and Paine (1900) Lancet ii p 881 932 Researches on Rheumatism—by the same workers Charchet publication

3 Swift (1931) Amer Heart Jour p 625 etc

4 Coburn (1936) Lancet ii p 102a

5 Schlesinger and others (1935) Lancet i p 1090 Lancet i p 1090

6 Bersaques of Belgium (1932) Jour Amer Med Assoc 98 April 23rd p 1490

Peculiarity The peculiarity of this joint affection is, its fleeting character, leaving one joint completely normal, while affecting others. **Fever.** Though variable, fever rises upto 102 to 102°F. It increases with exacerbation and relapse of the disease both being somewhat common. **Acid Sweat** A peculiar acid smelling profuse sweat is not uncommon. **Tongue** The tongue is generally peculiarly but heavily coated and appears foul (blanket tongue). **Bowels** Anorexia may be marked. Constipation is the rule and may affect the disease very adversely specially when protracted. **Urine** Traces of albumin in severe cases uro-erythrin of a brick red colour may be present. Urates are common deposits. **Heart.** Very important vigilance is needed for this organ. In about fifty per cent of all cases of acute rheumatic fever, acute endocarditis leading through recurrences in subsequent attacks to carditis and permanent crippling of the patient results unless care and attention are bestowed to the recognition and proper management of this condition.⁷ Strangely some standard bigger books on medicine and other workers have expressed doubt as to the presence of this disease in the tropics. It is common in Bengal and presumably all over India.

Clinical diagnosis of endocarditis may be made by about eighth to the twelfth day. The patient may or may not complain of palpitation. There may be pain in the precordium notably when the pericardium is affected. The fever may show a little extra and rise than usual and the resting pulse rate may be a bit too quick to explain. There appears a systolic bruit which may even show conduction towards the axilla with evidences of enlargement or not of the heart. **Leukocytosis** Generally a total white blood count between fifteen to thirty thousands is common. A secondary anaemia is also a marked feature of the disease. Quick sedimentation rate of the erythrocytes is common too. **Atypical cases** They are common in children and articular manifestations may be singularly absent but the heart is affected from the beginning hence it demands special consideration. Chorea may also manifest itself.

Complications are Carditis skin rashes of various types pleurodynia hyperpyrexia, chorea⁸ and others. The association of chorea with rheumatic fever is recently questioned by Coburn and Moore⁹ (1937). **Course** Under the present regime of full doses of salicylates ten days to three weeks course of the disease is common. When the course of the treatment is relaxed early recrudescence may occur. **Relapse** Relapses are very common in rheumatic fever as are the recrudescences. Relapses generally show all the manifestations of the primary attack though the degree of severity may be variable. The greatest danger of these relapses is in rendering the condition of the heart worse, in successive attacks. Morbidity appears to be a greater danger than mortality.

Rheumatic Fever in Children This demands special consideration in view of the fact that rheumatic fever in children is more often sub-acute and may even be insidious with involvement of the heart. The articular manifestations may be absent altogether while the heart is already badly damaged. Any vague pain in the body or so-called growing pains with sore-throat or any complaint of either palpitation, precordial pain, unduly quick

7 Dhar, (1934) Medical College Magazine, Calcutta, Reunion No June 1931
p. 117

8 Coombs' (1924) Rheumatic heart disease p. 6

9 Amer Jour Med Sci (1937) p. 197

resting pulse rate or rashes pain in the abdomen which cannot be otherwise explained—associated or not with any extra rise of temperature should prompt the doctor to examine the heart carefully and that from day to day As the early findings are mainly objective hence the importance of careful daily examination of the heart in a case of even suspected rheumatic fever, be it even of a mild or trifling nature Recently sedimentation rate of blood is said to be of some significance to ascertain the activity of the disease There may be some degree of leukocytosis

TREATMENT

The principles underlying the treatment are—(1) to relieve pain and distress, (2) to control the activity of the causative agents (3) to try to encourage the formation of the natural defences of the body and (4) to guide the patient through a judicious but slow and sure convalescence

Rest This is an invaluable item in the treatment It is necessary because —(1) the body cells are busy in overcoming an intoxication, (2) repair being undergone in certain tissues coincident upon inflammation (3) to prevent cardiac involvement rest is the next important factor to proper treatment by the specific drug

Bed The bed should be of firm consistency though soft and elastic The height and width should preferably be, wherever possible as in the hospital type of bed This helps easy nursing Sagging of the bed causes discomfort The drenching acid perspiration often requires thick but soft blankets for covering the patient as well as the bed Thin flannel night dress is advocated for cold countries For the tropical countries though flannel is suitable for the winter season, for the warmer months thin sleeping suit made of material which absorbs perspiration readily is to be used This clothing requires frequent changing as it gets wet through perspiration These garments should be so made that they can be readily opened up without entailing any difficulty to the patient, having extremely tender and painful joints

Room The room should have abundance of light and air A bright but cool and quiet room goes a great deal to counteract the natural depression of the mind characteristically inherent in the subjects of this disease An airy but sunny, bright room also tends to prevent respiratory infections to be superimposed

Diet This should consist of diluted milk, its preparations like whey, butter milk, cereals, bread, rice and its preparations During the acute stage there is an increased acidity of the urine, and there may be some truth in the "acid diathesis" in producing rheumatic fever, hence the importance of giving citrates and citrus fruits in the form of sweetened acid drinks of fruit acids, which are absorbed as

alkalies, in addition to the alkalies taken in medicine. For this purpose, each glass of milk diluted with half to equal amount of water containing about ten grains of potassium citrate per glass, sweetened with sugar or glucose, every two to three hours is used. The patient may be given three to four pints or about two seers of milk, or its preparations. Home made lemonades prepared of two lemons cut circularly, with salt and sugar to taste, in a pint of water is often liked by young patients. Only two seers or about three pints of milk supply about nine hundred calories which are generally not enough to maintain the requirement of the febrile patient hence the milk diet may have to be supplemented by either fruit juice, glucose, sugary materials, cream, cocoa etc., during the acute stage and in the sub acute states by soft boiled rice, typhoid bread soups fruits eggs fish, etc. One should remember that in these patients there is much emaciation with loss of weight. Here comes the importance of a liberal dietary, to partly counteract the inanition. There appears very little justification, in denying during convalescence small portions of meat to a patient who enjoys it.

Fluid Besides the fluid in the milk, one should give alkaline glucose drinks, plain water, green cocoanut water where available aerated waters and other suitable forms of drink containing citrates and citric acid, which are absorbed as bicarbonate and help in the alkalinisation of the system, rendered somewhat acid by the activity of the streptococcus rheumaticus. About another three pints of fluid would be useful besides the milk taken.

Bowels In all sthenic cases where there is no contraindication divided doses of hydrog subchloride, say in one fourth grain with one grain of sodium bicarbonate should be given four to eight such, hourly at night, to be followed by saline purge like an ounce of saturated solution of magnesium sulphite the following morning. It has been found out clinically that before starting treatment with salicylates if the bowels are kept open and are freely acting, the results of treatment are more satisfactory than when constipated. Once the salines have acted well the bowels may be kept working by either cascara, or senna or liquorice and others (see constipation).

It is worth remembering that the streptococci or other organisms specially those from the throat pass into the intestines and constipation means additional burden of absorption of toxins from the gut resulting in a worse state of the disease. Hence the importance of unburdening the system of this toxic load, thus giving it a chance to recover.

In bad asthenic cases mild aperients and effective enemis of sufficient bulk of about two pints for an adult, and about one pint for

an adolescent are required. Along with the salicylate mixture some suitable aperient may advantageously be added.

Sleep. This should be ensured by bromides in ten to twenty grains Veronal and medicinal in two to five grains, in cases of cardiac involvement, paraldehyde in one to two drachms in either orange juice or syrup of orange, with a few drops of oil lemon may hide the disagreeable smell and taste of the drug, and prove useful.

Local Application—of warmth on the painful joints is generally appreciated specially during the acute stage. Later on when the acuteness of the local inflammation is less alternate hot and cold application scientifically known as *contrast bath* may be employed with advantage. This helps in the speedy recovery of the pain in the joints.

As regards liniment etc. one finds the stronger counter irritants to be of better service than the milder ones. For this purpose all suitable counter irritant liniments or embrocations may be used with efficacy. Of these Wintogeno is strong and effective. For this purpose a liniment like the following is of use.

Oil Gaultheria	{	each dram one
Camphora		
Liquor Ammon fort		
Menthol		
Iodine Crystals		gr 10
Tincture Capsicum		m 15
Soda Bicarb		gr 20
Oil Sassafras		ad fl oz 4

shake well and apply locally by gently rubbing on the painful joints, before and after each local application alternately of heat and cold. Simple oil of wintergreen when applied on the joints and covered by cotton wool and kept warm, may do good. After the local application the joints should be kept covered by either flannel bandage or cotton wool wrappings so that local chilling is prevented. Fomentation of the joints by cotton wool warmed up, or application of cataplasma krohni or antiphlogistine group of remedies, may do some good. A very suitable application is made by two drachms each of methyl salicylate or oil of wintergreen, terebene, and oil of eucalyptus.

Specific Treatment The best plan is to start with a brisk purgative, followed by twenty grains of sodium salicylate with double the amount of sodium bicarbonate with one drachm of syrup of ginger and aqua chloroform upto an ounce. This should be given every two hours for the first three to six doses, then every four hourly for another twenty four hours, to be followed by six hourly doses for another twenty four hours, then the dosage is made half, and given four to six

hourly till the condition of the patient improves. In most cases along with the above prescription about ten to twenty drops of extract cascara sagrada may have to be added per dose. Some prefer about ten instead of twenty grains of sodium salicylate. The natural sodium salicylate though pure is rather expensive, hence cannot always be used in general practice.

For an average case a prescription like the following may be used with advantage:

Sodium Salicylate	gr	15
Sodium Bicarbonate	gr	30
Extract Cascara sagrada liq	m	15
Tincture Belladonna	m	3
Syrup Zingiberis	m	60
Aqua Chloroformi	ad fl oz	1

one dose every three hourly for the first twenty four hours every four hourly the next twenty four hours then six hourly the third day and later on.

A child of ten years may be given half the above dosage with advantage. Generally if any patient suffering from arthritis on full doses of sodium salicylate for forty eight hours with clean bowels does not show any improvement is almost certainly not suffering from rheumatic fever.

Those who are sensitive should receive salicin in ten grains. These medicines should be continued at least for a full fortnight after complete cessation of the fever. Later on a tonic preparation like Easton's syrup or any other suitable tonic may be used with advantage. Vitaminous tonics are to be used during convalescence. Some recent workers are stressing on the use of vitamins A and C¹⁰ in particular but this is yet an open¹¹ question.

Quinine Quinine salicylate in five to ten grains thrice daily is useful where salicylate alone is not very effective. Children tolerate it easily in five grain doses with alkalies, in syrup and water.

Neo cinchophen (Tolysin) It is specially useful in rheumatic carditis of young subjects and is given in five to ten grains every four hourly. Though expensive, it may be given in cases of intractable carditis where treatment by salicylate alone has not proved upto the mark. It is prescribed also with double the amount of sodium bicarbonate, but may cause damage to the liver, hence given cautiously.

Anæmia Anæmia is best combated by ferri et ammon citrate in ten to twenty grains, followed by dilute hydrochloric acid, twice

¹⁰ Rinckhart and others (1933) Jour of Pract Med 59 p 97

¹¹ Abbasy and others (1936) Lancet ii p 1413

daily after the principal meals. Other suitable anti anemics may also be given. In bad cases injection of liver extract may accelerate blood regeneration.

Convalescence Convalescence has got to be very much prolonged, because of the risk of an easy relapse even when the patient is cured completely. The causative organism appears to have prolonged vitality, and the patient should receive at least a fortnight's treatment after the fever has come to normal. Before allowing him to rise on his feet, the affected joints should be regularly massaged and anointed with the liniments mentioned above, thus preparing them (joints) to sustain once again the body weight. For this purpose warmth in the form of contrast bath, massage, etc., are of service.

Besides iron, good food, prevention of constipation, milk, eggs, fruits, butter, help in quick recovery. As a tonic a prescription like the following one may be of service:

Syrup ferri Iodide	m	60
Quinine bishydrochloride	gr	2
Lax Cascara sagrada liq	m	30
Liquor Arsenici Hydrochlor	m	3
Glycerine	m	20
Aqua Chloroformi	ad fl oz	1

one dose thrice daily after food

Sulphur and Iodine Colloid Sulphur, initially from one teaspoonful increased upto a table spoonful, thrice daily, may be tried for a few weeks with some advantage.

One teaspoonful of colloid iodine, orally, or one to two c.c.m intramuscularly, better per vein, every alternate days, for about a fortnight, may be of use.

Calcium Personally one has found alternate intravenous injections of iodine solution starting from one c.c.m increased upto three c.c.m and calcium gluconate ten per cent solution five c.c.m once a week each, for one to two months to be somewhat effective in preventing recurrences.

Salicylates by other routes Since oral administration is quite effective and there appears very little advantage in either rectal or intravenous medication, one does not advocate any other than oral route for administration of this specific.

Idiosyncrasies to salicylates Generally most people tolerate this drug fairly well. Where there are signs of intolerance the natural preparation should be used and its effects noted. If still there is sensitiveness either salicin or quinine salicylate or ne-oemphophen may be used in proper dose and method. Mental depression may be a

symptom of rheumatic fever and not due to sodium salicylate. But one should remember that poisoning is generally seen when the renal or hepatic function¹² is defective.

The symptoms are dimness of vision, buzzing in the ears, deafness, giddiness. There may be headache or vomiting which is difficult to control. The cardiac manifestations are small, slow and even irregular pulse. The heart sounds are feeble. The extremities may be cold and clammy, the patient looks extremely depressed. There are some grave symptoms demanding special and immediate care. They are slow and deep respiration with profuse urination or oliguria, and the patient dies in a condition indistinguishable from diabetic coma. As rheumatic fever of very toxic type may show some of the above symptoms, some workers are doubtful if moderate doses, say ten to twenty grains three hourly, may at all produce symptoms of poisoning. There is no doubt that there are cases of intolerance to salicylates. It also appears that sodium salicylate is useful for the arthritis and pain but not effective against carditis. Indirectly however it may prevent cardiac damage by keeping the rheumatic condition under control.

Treatment of Poisoning by Salicylates. The patient should be induced to drink plenty of normal saline and glucose with citrates, say four ounces of glucose with three drachms of potassium citrate in a pint of normal saline.

In more severe cases intravenous glucose and subcutaneous injection of insulin should follow oral saline and glucose. The number of units of insulin injected should be half that of the amount of glucose in grams, i.e., if twelve grams of glucose are given six units of insulin should be injected. This treatment along with subcutaneous or intravenous transfusion of normal saline should be continued. Cardio respiratory stimulants alkalies need be given freely. It is needless to say that the salicylates should be withheld altogether.

To prevent relapses. Vaccine made from proper type of streptococci, or other suitably prepared vaccines of bacteria isolated from the throat and other parts of the patient, or the possible variants of the streptococci are being given intravenously^{13, 14} with promising results.

Concentrated anti scarlatinal serum. Frison and Carpenter (1937)¹⁵ have used about thirty to fifty c cm of anti scarlatinal concentrated antitoxin and consider the effects promising enough for more extended trial.

12 Sara De Alzaga, (1937) Semana Medica 44, 14th January, 1937 p 87 arr, 1937 p 87

13 Swift, (1930) Jour Amer Med Assoc 20th June 1930 p 2091

14 Ibid, (1932) 98 June 25th p 2313

15 Quart Jour, Med, (1937) 6 p 93

Hyperpyrexia When the temperature reaches 106° or 107°F cold bath should be used, starting at first from about 90°F rapidly cooled down by ice. But tepid bath may be useful. Careful watch should be kept on the pulse, respiration etc., and if collapse is apprehended proper steps taken. On reappearance of the hyperpyrexia, the bath has got to be repeated. For the details the corresponding portions about bath treatment of typhoid fever may be consulted.

Complications Pleurisy, pneumonia, pulmonary oedema, abdominal pain etc., should be treated on the general lines.

The question of tonsillectomy is discussed in the chapter on chronic tonsillitis.

Choice of occupation etc. These are very important points demanding care and thought of the medical man, but is beyond the scope of the present work. The question of forming colonies of rheumatic patients with suitable occupation and so on is being considered by English medical men.

CHAPTER XVI

MUMPS

(*Epidemic parotitis*)

Diagnosis. Though common in persons between six to fifteen years no age is exempt, except the immune elderly. The greatest number of cases appear to occur during the winter months. It may assume an epidemic character. May affect the people in schools, barracks etc.

Generally the incubation period is three weeks, though variation of fourteen to twentyfive days is not uncommon.

Infection spreads from the patient. But apparently healthy intermediaries or sonites may rarely transmit the disease.

Signs and symptoms. Swelling more commonly starting from the left parotid spreads to the right one. There may be the only complaints. A few however show signs of general infection with variable pains distributed, more or less all over the body. The glands go on increasing in size for the first two three days forming an ill defined elastic swelling obliterating the sulcus between the mandible and the mastoid bone. This lifts the auricle away from the head in a characteristic manner. The skin may in rare cases appear red. The swelling of the other gland starting in a day or two with some rise of fever is highly suggestive of this condition. In rare cases the interval between the onset of swelling of these two glands may extend even upto three to five days.

The jaws feel stiff and there may be temporary loss of sensation of taste. Though not invariably present sour foods provoke pain in the affected gland and is thought to be a significant symptom. The submandibular and the sublingual glands may be involved in a few cases, similarly also the cervical lymph glands may be affected.

Temperature. The pyrexia seldom rises above 102°F and subsides in a day or two. Completely afebrile cases have been noted. In rare cases higher ranges of temperature and associated constitutional disturbances may be encountered.

Abortive cases. Many cases of mumps do not show any such symptoms as to establish a diagnosis, but all the same they confer protection.

Complication. **Orchitis.** By the seventh or eighth day of illness these complications generally start affecting boys at puberty and in young adult life. The onset is with pain and tenderness in the testes. There may be associated with it grave nervous symptoms, high fever and even intra abdominal symptoms. Generally these subside in a week's time. About fifteen to thirty percent may develop these complications and sterility may be a sequel.

In females the ovaries may be similarly affected.

1 Tiedjung (1928) *Ziets f Kinderheilk* 46 p 302

2 Ohlmacher, (1930) *Jour Amer Med Assoc* 106 p 2053

Pancreatitis. It is said to be more common in certain epidemics than in others. There is acute pain in the abdomen, vomiting and other symptoms suggestive of acute abdominal trouble³. Hence the importance of remembering the history of an attack of parotitis.

Other complications may manifest in the form of meningeal syndrome such as headache, photophobia, delirium and even stiffness of the neck.

Deafness, optic neuritis⁴ and other complications may also be present. Encephalitis is reported⁵.

TREATMENT

Prophylaxis. Three to four weeks' isolation should be enforced to contacts and the patient. The maximum infectivity appears a few days before the appearance of swelling of the glands.

The patient should be strictly confined to bed. The incidence of orchitis is much lesser in those who are confined to bed till the possibility of its appearance is over. Prophylactic value of convalescent serum is doubtful.

General. The room should be airy, and ventilated. Good care of the mouth, nose, ears is always indicated. Bowels should be kept regular as is usual in all acute infections. Their movement once a day should preferably be ensured either by mild laxatives or by an enema. Tepid sponging, plenty of fluids are of use. Diet is given in the form of milk and its preparations. They may be given flavoured with the numerous flavouring agents used for the purpose such as, cocoa, tea, ovaltine, vitacup, vitavose etc.

MEDICINES

Organic arsenicals were injected with the idea that it is a spirochetal infection. But this appears to be of doubtful efficacy. A mixture containing five to ten grains of sodium salicylate with double the amount of sodium bicarbonate and one to two grains of potassium chlorate per dose may be given every six to eight hourly. Sleeplessness or other symptoms need proper lines of management. Mouth washes and gargles are of value.

LOCAL TREATMENT

Heat. Dry heat in the form of hot cotton pads is often gratifying in the milder cases, hot water bottles are used with variable success. Small sand or salt bags, devised at home according to requirement may be utilised for this purpose.

3 Martirelli (1934) *Pediatrics* 42 p 1452

4 McKaig and Wolman (1931) *Arch. neurol and Psychiat.* 23 p 795

5 Smith (1937) *Lancet* i p 754

6 Kermorgant, (1926) *Inn der Med.* 19 p 301

Hot fomentations in form of hot compresses either by flannel or cotton wool may be efficacious. Before applying these on the patients' parotid glands, the degree of the heat should be tested by feeling with the palm, otherwise there is risk of burning the skin. They should be renewed as soon as are cold. Once these hot applications are over the glands should be kept covered by dry cotton wool.

Cold Some patients find greater relief from cold than from warmth. Ice bags may be utilised for this purpose, the circular ice-bags being very convenient. All air should first be driven out of the bag and a layer of flannel should intervene between the bag and the skin of the face. Suitably devised ice poultices may be used for this purpose also. In case nothing is available, a piece of ice wrapped in a towel may be applied over the swollen parotid at intervals of a few hours. Cold water compress may be of relief.

Contrast bath. The application of heat and cold alternately appears to be of greater use than either alone.

Local application Local application of ichthylol belladonna and glycerine over the inflamed gland may be of effect. But this is very messy, hence one has found the following, rather neat application, to be of service.

Ichthylol	gr 120
Lat Belladonna Sicum	gr 10
Menthol	gr 4
Collodion	ad fl oz one

to be applied on the glands every one to four hours. This black application as soon as it gets dried sticks to the skin and is not messy. It has the advantage of not staining the clothes or the pillow of the patient.

Convalescent Serum Tessier (1925)⁷ used about twenty c.c.m. of convalescent serum intramuscularly with some effect and the complications were less.

TREATMENT OF COMPLICATIONS

Orchitis Absolute rest in bed and suspensory bandages to support the inflamed testes are the most essential measures and very little else than these are required for the milder affections. In cases where suspensory bandages are not possible to be procured a suitably devised 'T' or other bandage may be utilised for the purpose. Pillows placed between the things with another to support the bended knees may form a resting

⁷ Tessier (1925) Bull Med 39 p 349

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Heat Dry heat in the form of hot cotton pads is often in the milder cases, hot water bottles are used with vinyl. Small sand or salt bags devised at home according to 1 may be utilised for this purpose.

³ Martinelli (1931) *Pediatrics* 42 p 14-2

⁴ McKaig and Wolman (1931) *Arch Neurol and Psychiat* 33 p 795

⁵ Smith, (1937) *Lancet* i p 754

⁶ Kermorgant, (1926) *Inn der Med* 19 p 301

CHAPTER XVII

DENGUE FEVER

Dengue is probably derived from the Spanish word 'denguero' meaning a dandy. This may have originated from the stiff and diminished gait and posture of the subjects of dengue suffering from severe aches and pains in the limbs.

It is probably caused by a virus conveyed from human sufferers during the first three days of illness by certain species of mosquito². The incubation period is commonly from four to seven days with extremes of two to fifteen days.

The specialities of this group of fevers are^{3,4}—

Fever of short duration—minimum of one and rarely exceeding seven days.

The types of temperature may be of continued type, saddle back type, in which the temperature shows a fall on the second, third or fourth days after the initial fever to rise again by the fifth or sixth day resembling the back of the saddle used in riding horses. The other type is the interrupted type with two phases in this unlike the saddle back type the temperature reaches normal once to rise again.

No parasites are encountered in the patients blood leukopenia of a progressive type is common.

It differs from influenza, tonsillitis or other fevers of short duration, by the peculiar absence of any catarrhal characteristics diagnostic of the above conditions. The mortality in this disease is negligible. The tendency to kidney damage and to haemorrhage so common in yellow fever is completely lacking in this but scleral albuminuria is not unknown. These fevers occur under conditions favourable to the spread of infection from person to person by *stegomyia* mosquitoes. They may appear in epidemics or as sporadic cases.

Commonly the disease is prevalent in autumn. One attack confers some immunity and hence the subsequent attacks are milder and are of shorter duration. The fever generally of 102° to 104.1° lingers in the non immune for seven days with slight intermission or complete remission in between. But in the immune subjects the duration is seldom more than three and a half to four and a half days. Rarely the whole course may last for one day only.

Pains and aches etc. With the abrupt rise of temperature there is generally frontal headache pain in the eye balls. There may be a flush present all over the body of the patient who in most instances complains as a rule of severe pain in the back and limbs.

1. Hoffmann and others (1912) Proc Acad Sci Amsterdam 25 p 209

2. Sarcosarwa (1924) Ann of Trop Med and Parasitol Aug p 151

3. Siler, Hall & Hitchens (1925) Jour Amer Med Assoc April, 18th p 3163

4. Rogers & Megaw, (1900) Tropical Medicine p 170 Churchill publication

place, though they have the disadvantage of curtailing the freedom of movement of the patient

Dry poultice Warmth in the form of dry cotton wool fomentation wrapped with abundance of cotton about the scrotum retains the heat for a long time

The time honoured application lotioplumbi et opii, or any such suitable application may do some good

Ovaries, mammary glands and vulva may be affected in the females and demand rest, application of warmth etc

Pancreatitis Warmth or cold on the surface, at site of pain, limitation of diet specially of fat, may be useful As the trouble is often transient there may be very little permanent trouble left.

Meningo-encephalitis There may be headache, nausea, vomiting, even of a severe nature, slight rigidity of neck, Kernig's sign and so on

Lumber puncture, ice bag on the head, rest etc are of use

Conciousness Tonics, iron, arsenic, vitamins A, B, C and D in liberal amounts may be tried with good effect.

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1 Hoffmann and others, (1932) Proc Acad Sci Amsterdam 35 p 909

4 Sarcocerasos, (1923) Ann of Trop Med and Parasitol Aug p 151

2 Siler, Hall & Hitchens, (1925) Jour Amer Med Assoc April, 18th p 1163

3 Rogers & Megaw, (1930) Tropical Medicine p 170 Churchill publication

Pains may vary, but the typical case complains of severe aches and pains justifying Rush's name "break bone fever". But in some epidemics they may be very slight or moderate.

Rashes By the fourth to the sixth day there may be a measles rash seen in twenty to ninety percent of the patients varying in different epidemics in limbs, trunks and palms of the hands. They may persist for a few days after the fall of the temperature.

Other features Slow pulse, leukopenia, nausea and vomiting, enlargement of the lymph nodes, depression of spirit are suggestive diagnostic points.

Diagnosis has got to be made from influenzal group of fevers commonly showing catarrhal manifestations with a tendency towards complications etc.

Measles, small pox and rarely rheumatic fever may be mistaken for this disease.

TREATMENT

The patient should go to bed and rest there till he feels quite well. A comfortable bed, in a well ventilated room, is useful. He should be encouraged to drink as much water as he can. Cool sponging during high temperature may be soothing.

Diet During the acute stage, the diet should consist mainly of liquids such as fruit juice, barley water, glucose drinks etc. But later on, when the anorexia and nausea is better, milk preparations, soups, broths, milk and sago or barley, etc. are convenient forms of diet. During nausea, green cocoanut water, lemonades, milk and soda or glucose water with lemon juice, with a pinch of salt in it, may be gratifying to the patient.

Bowels They should be kept open during the earlier sthenic stage of the disease by divided doses of hydrarg subchloride at night, followed by some suitable salines, like saturated solution of magnesium sulphate, in half to one ounce, or Seidlitz powder, in suitable doses, in the following morning. But when first seen during the latter part of the illness it is better to be satisfied with simple enemata, as purgation may exhaust the already ill patient.

Pains and aches For the pains, sodium salicylate in five to ten grains with double the dose of alkalies, phenacetin in one to three grains are of use. The recently introduced analgesics like veramon, novalgin, compral, gardan, may be given in two to three grains every four to six hours, when the pain is at its worst. In very severe pain morphine group of drugs may have to be used. A prescription like the following may be used every six hourly in bad cases.

	Aspirin	gr	3
3	Phenacetin	gr	2
4	Mc	gr	1
5	Smit	ad gr	10
6	Korm		

One powder every six to eight hours. If to the above prescription about two to three grains of veramou or conipril or novalgin, are added, the relief of pain may be satisfactory. For the night, to promote sleep, the caffeine should be withheld and half a grain of luminal substituted in its place. Pyramidon produces agranulocytosis hence is risky.

Locally. Ice cap on the head, and ice applied on the eyes may be soothing. For the aches and pains in the body, application of warmth and some anodyne or counter irritant liniment containing methyl salicylate, camphor and others may be used with advantage. Vicks vaporub is good. Orodine with methyl salicylate is useful.

Nervous system and insomnia. The patient should be left alone as visitors are often annoying. For insomnia suitable hypnotics are indicated luminal chloral or bromides may be suitable. Goldie (1929)⁵ regarded the symptoms like a protein shock and advised calcium and adrenalin injections.

Complications are very few. Haemorrhages are not very rare and deserve treatment in the usual lines.

Convalescence. It is surprising how much delayed convalescence sometimes may follow such a trivial illness. Good vitaminous diet, tonics like Easton's syrup, syrup minadex or ferradol may be used with advantage.

Prevention. All ways and means to prevent the breeding of the mosquitoes should be investigated and preventive measures adopted. Mosquito curtains are useful and the patient should be kept under it from the beginning. For other measures special treatises should be consulted.

CHAPTER VIII

PLAQUE

Diagnosis During an epidemic of plague it is easy specially in the bubonic type. But before or after an epidemic notably before the presence of plague is suspected or known a diagnosis may be extremely difficult.

The presence of rat epizootic in the overcrowded affected areas known to be endemic for plague and in the proper season should always arouse suspicion whenever a doubtful case occurs.

Laboratory examination Generally one comes to a certain diagnosis, from the only sure test consisting either in a positive culture of the material derived from puncture and aspiration of the primary hubo which gets swollen and painful before the secondary glands are similarly affected or by a positive cultural result of the blood specially in septicemic forms. Properly staining the material derived from puncture of a gland and examining under the microscope the diagnosis may also be arrived at. A leukocytosis varying from ten to forty thousand with a polymorpho-nuclear preponderance is again suggestive.

Clinically An irregular and high fever associated with toxæmia commencing almost immediately with the rise of temperature either preceded or followed by or associated with a painful enlargement of the groin glands in a vast majority though not uncommonly of the axillary or cervical primary buboes should make one suspect the disease. Periglandular oedema is almost always very distinct. Skin rash, enlarged spleen, quick pulse of a small volume and low tension often diastolic, laboured shallow and rapid respiration rate varying from thirty to sixty per minute, in anxious expression some time a flexed attitude have been described on the second or third day of plague as the pathognomonic picture which suffices for a ready diagnosis.¹ On account of the pain the patient assumes the position best suited to relieve pressure on the affected glands that is flexion of the leg on the trunk in primary inguinal hubo, the arm close to the trunk in primary axillary hubo, and the head to the affected side in primary cervical hubo.¹ This explains why the pathognomonic flexed posture is encountered in cases of bubonic plague.

Septicæmic or fulminating plague At the beginning of an epidemic in the absence of bubonic septicæmic cases plague may present considerable difficulty in diagnosis. Season dearth of rats in numbers with a suspicious clinical picture should arouse one's suspicion of plague. Positive blood culture and leukocytosis are points diagnostic of the disease.

The onset is sudden with high fever, delirium, prostration etc. Prodromal may or may not be present. All the symptoms are usually very sudden at onset and are very severe. Though no primary hubo is there yet a generalised painful adenitis is often encountered. Prostration is very marked from the beginning and coma may supervene quite early in the disease. Severe persistent vomiting, bloody diarrhoea are frequent. The spleen is palpable the pulse is rapid of low tension and diastolic. Death almost invariably

¹ McCoy (1925) Plague Osler's Modern Medicine Vol I p 600 3d Edition Lea & Febiger Publication

ably results from eighteen hours to three days after the onset. Commonly cases are intensely hemorrhagic.

Pneumonic Type. Besides the above findings in the pulse spleen prostration and so on there is in pneumonic plague sudden rise of fever with pains headache, vomiting and other signs and symptoms.

But the very quick rate of respiration going even upto sixty to seventy per minute cyanosis of a pronounced degree prostration frothy bright blood red sputum etc are all helpful and suggestive points. Unless these are borne in mind and suspected the diagnosis may be missed. But by staining the sputum if the *Yersinia pestis* are encountered under the microscope and when recognised by the typical bipolar appearance, the clinical diagnosis is confirmed.

This pneumonic plague manifests itself in two varieties one the bronchitic and the other broncho-pneumonic in type. It is highly contagious and spreads by droplets like wild fire and is almost invariably fatal.

Secondary Pneumonia, complicating bubonic plague generally develops from emboli or aspiration of infected material. Though the increased respiration rate and cyanosis are of no diagnostic value as both occur in non pneumonic cases too but small areas of dullness rales giving the impression of infection of the superficial areas of the lung may help in the diagnosis.

TREATMENT

PROPHYLAXIS

Carriers The patient should be isolated, all secretions and excretions disinfected. Unless he has an open and draining bubo, with *Yersinia pestis* in the pus, there is not much risk from the patient of bubonic plague. But if the house abounds in flea infected rats, the place is obviously very dangerous. Otherwise a case of bubonic plague by itself is not a very bad source of infection. The most dangerous is the pneumonic type of cases which helps the spread of the disease through droplets, with surprising rapidity. The sputum of septicemic, and in pneumonia in bubonic type, may cause the dissemination of the organisms, though these bacteria die quickly when dried or exposed to the sun.

Rats But by far the most important item in prophylaxis consists in elimination and destruction of rats by all means known.

When there is an epizootic in rats in an area known to be infected, the human beings, should preferably leave the locality and live either in the open or in other places where grains, food and drink of rats are not available. The rats will go to places where they can find food and water. The life of other rodents of the locality also need investigation to ascertain the likely possibility of their acting as carriers of the fleas.

Expert medical supervision of the sick and the dead would serve to disclose cases which otherwise would escape detection. A special hospital for suspected cases, may afford better facilities and serves to

segregate the infected houses in which more than one patient or dead rats have been found, need not only fumigation, but disinfection is to be followed to exterminate all rats and for safety it is better to leave the house for a few days. Cargoes from infected ports may harbour infected rats, hence proper steps should be taken.

Prophylactic Inoculation Plague vaccine prepared by the Haffkine's institute of Bombay when injected confers some degree of immunity. The reaction is less severe now by modern vaccines than those derived during the earlier days of inoculation of plague vaccine. The dose is from half to two c.c.m. or more every ten days. Those working in plague stricken areas when properly inoculated only one percent got infected, whereas, in the un inoculated controls the infection rate was six per cent or more. Recently² attenuated living organisms are being injected with good protection.

Curative Treatment The treatment of this disease is unsatisfactory. The mortality varies from ninety seven to thirty per cent depending upon the nature of the epidemic, the resistance of the individual and particularly on the number of the bacilli circulating in the blood at the earlier period of the infection. Pneumonic cases are almost invariably fatal.

Serum Recently the workers of the Haffkine institute are said to have prepared a very effective antiserum for plague. The result of treatment by hundred c.c.m. of this antiserum given at the very earlier part of the infection per cent and repeated every eight hourly as required till fever comes down, was said to be effective. But controlled trials in hospitals did not seem to testify to the efficacy of serum prepared some time back. The recently prepared serum of the Haffkine institute is said to be more effective. All these sera should be given very early in the disease³.

Difficulties in getting a universally potent serum It was soon found out that the stock serum effective against bacilli in India, was not of much use for cases of plague some where else. Not only this, the serum was almost useless, when the infection was caused by different strains of plague bacilli. Hence the strict specificity of this serum was another difficulty in having a universally effective remedy. When polyvalent freshly prepared sera, are employed for treatment of cases of plague, caused by homologous group of bacilli, good results are likely to follow.

Bayer 205 Vincent and Rao (1932) treated three cases of plague by intravenous injection of 0.9 gram of this preparation in ten c.c.m.

² Otten (1930) Ind Jour Med Research 21 No 1 p 73

³ Ind Med Gaz (1932) Nov p 626

of distilled water with recovery. The number of cases treated are too small to deduce any conclusion about the efficacy of this remedy, though the results appear encouraging.

Bacteriophage d'Herelle (1925)⁴ employed his bacteriophage in treatment of four cases of bubonic plague in Egypt with success.

"A dose of one c cm. of the filtrate (bacteriophage) was injected in one hubo, or two injections, each 0.5 c cm. was given in two buboes. In three patients injected the first day after appearance of a hubo, the general condition improved within a few hours after the injection. Two injections were needed in a case in which the treatment was not started until the third day of the disease. All were grave cases, all recovered. No other treatment was applied, but the bacteriophage was known to be exceptionally active."⁵

Unfortunately the experiments with the plague bacteriophage in the treatment of patients in south India did not prove effective. This experiment was undertaken somewhat recently.

Iodine Originally used in the treatment of plague by Conor was tried by many workers. Bharadwaj⁶ (1926) used to give intravenously, in five to ten c cm. daily for four successive days, an iodine solution containing eighteen grains of iodine in four ounces of normal saline. His early cases were very easily controlled. Three to five injections being required to effect a cure. Many workers have confirmed these results, but many experienced workers do not think it to be of much use.

Mercurochrome Ten c cm. of a half percent solution intravenously has been advocated.

General management The same precaution of isolation and disinfection should be adopted as is suitable in such a serious and highly infectious disease.

The room should be devoid of extra furniture, open and airy. Nursing should be adequate and the doctor should try to guard all complications. Visitors, relatives or other people should not be allowed to go near the patient. The nurses and attendants should not only be protected by preventive inoculation but wear gloves and masks while attending the patient. In bubonic cases not uncommonly a pneumonia develops, which might have been caused by various ways, such as by infarction, or lobular consolidation of the lung, or by other

⁴ D'Herelle (1925) *Jour Amer Med Ass* 75, p 1693 and also *Presse Med*, (1925) 33 p 1393

⁵ Beckman (1930) Treatment in General Practice Plague, P 108, Saunders Publication

⁶ Bharadwaj, (1929) Plague Ind Med Gaz 2 p 63

means. Here the sputum may abound in plague bacilli, hence it is always worth taking rigid precautionary measures. The bouts of cough may spray out the bacilli to the bystander and so the need for care and use of suitable masks and other preventive contrivances.

The secretions, excretions, sputum, blood and discharges from the bubo are infective, and should preferably be burnt out instead of leaving to chance disinfection by chemical antiseptics. Boiling in permanganate solution may be an effective way of dealing with the dangerously contagious materials.

Fever For the fever and hyper pyrexia, cold packs and sponges are of use. Plenty of cold water taken freely is useful in reducing the toxæmia.

Bubo Warm compresses may give relief. Glycerine ichthylol and belladonna applied locally and covered with cotton wool may be of some use. Less messy is a preparation prescribed in the treatment of mumps. The buboes should be opened up as soon as suppuration starts. Dressing the ulcers by saturated solution of magnesium sulphate and glycerine in equal parts is of use. Ichthylol and iodine dressings have been also advocated. Potassium permanganate solution is also used as a dressing.

Heart For the heart, cardiac stimulants may be of service. Glucose insulin injections are sustaining to the organ.

Sedatives For the restlessness and toxæmia, plenty of cool water orally or saline subcutaneously or rectally should be given, so that the urinary output reaches about fifty ounces in twenty-four hours.

When marked restlessness develops morphine and atropine in $\frac{1}{4}$ and $\frac{1}{150}$ gr doses respectively may have to be given to an adult. Rectally chloral and bromide have also been of use. They are generally employed to an adult for rectal use in twenty to thirty grain doses each, and may have to be repeated.

CHAPTER XIX

ERYSIPelas

DIAGNOSIS

It is an inflammatory disease of the skin due to haemolytic streptococcus infection, characterised clinically by local redness swelling having a spreading margin with a tendency to spread through the lymphatics showing intermittent or remittent fever associated with prostration of a variable degree.

The infection may start from the organisms residing in the nose and mouth. The face is the commonest site of affection next come the legs etc. In a series about eighty eight percent were on the face and about eight percent on the legs and feet.

It is inoculable and contagious. The common sources are the unclean hands fomites instruments and infected persons. As a rule the nasal mucosa contain the organisms and may infect when local or general resistance is lowered.

Predispositions commonly are —

Season. May occur at any time when the systemic and local resistance is lowered.

Age and Sex. It is common in newborn infants one of the writer's cases recently occurring in an infant twenty eight days old. Commonly it is seen between twenty to thirty years of age. Females are more affected than the males.

Previous Attacks. One attack predisposes to recurrences. Debilitated persons, or persons with infected nasal cavity may get recurrences easily.

Debilitating conditions. Chronic diseases like tuberculosis nephritis alcoholism, heart disease cirrhosis of liver cancer diabetes etc which lower the resistance generally predispose to this infection.

Slight abrasions, fissures, cuts or scratches even when they are too insignificant to scrutiny, may be the portals of entry of the organisms.

Incubation. The period of incubation may vary from three to seven or even ten days. During this period the patient may complain of anorexia, malaise, headache with slight pyrexia and so on.

Clinically Symptoms may be general and local.

General Fever onset of fever with chilliness or rigor ranging up to 105°F or more, continuous at the beginning, later tending to be remittent or intermittent in less severe cases, declining either by lysis or crisis in about seven to ten days time are suggestive.

Pulse and Prostration. Pulse rate is accelerated of good volume, but easily compressible having characteristics of septic pulse. The depression may be out of proportion in alcoholics, diabetics or in persons with debility.

Nervous Symptoms. Headache and nocturnal delirium are not uncommon.

Tongue. Tongue is usually heavily coated and nausea vomiting are generally present Constipation though the rule, rarely diarrhoea may occur

Lymphatics Enlargement of the lymphatic glands draining the affected area is almost invariable, the spleen may be enlarged

Metabolism There is increased metabolism even upto forty two percent above normal

Local Symptoms In facial type the starting point often is the bridge of the nose It feels hot tense painful and sensitive to touch Almost immediately a small red swollen shiny area of inflammation with a tendency to creep out develops There is a line generally present separating the inflamed red angry looking spreading affected margin showing vesicles in the diseased area from the normal skin just outlining its border The inflammation may spread from the original focus on the face to the head neck and scalp In the fully developed case the swollen face eyelids ears and the peculiar tumid appearance may disfigure the patient beyond recognition The same applies for cases of erysipelas of the legs

Mucousmembranes From the skin the inflammation may spread to the mucous membranes of the pharynx larynx trachea or even to the bronchi Edema of the glottis is not rare The mucous surfaces may be the primary site of infection There is in such cases intense pain redness swelling with a sharply defined outline of the affected mucous surface The lymphatic glands of drainage often show enlargement

Types of affection Erysipelas migrans when it spreads to the trunk etc erysipelas vesiculosum when the spreading margin shows vesicles or blisters when these blisters suppurate then is called erysipelas pustulosum if there is necrosis erysipelas gangrenosum There may be phlegmonous and relapsing types also Erysipelas of the newborn may start from the umbilicus

Complications, in order of their frequency are abscess arthritis lobar pneumonia active delirium phlebitis pleurisy acute nephritis synovitis diarrhea tonsillitis and so on

Relapses are quite common

Bacteriological Culture of the material from the vesicles or from the spreading zone or from the original site of affection may show the typical hemolytic streptococci Other methods of diagnosis should also be taken help of

Differentiation has to be thought of from eczema urticaria angioneurotic edema These show much less severe constitutional symptoms and are often afebrile and have their characteristic symptomatology

Anthrax of the face may be difficult to diagnose from erysipelas But the swelling of anthrax is very firm, the characteristic central black eschar surrounded by a ring of vesicles is distinctive But for positive differentiation cultural and microscopic examinations should always be made

Mortality varies according to presence or absence of factors causing delirious also on age severity of the infection signs and symptoms supervention of complications time and promptness of treatment etc

Prognosis Persistent quick pulse high continuous or remittent fevers, delirium stupor are of bad prognostic significance. Excessive suppuration, pneumonia, nephritis, gangrene etc. are of bad import. After forty-five years the death rate is about four to six percent whereas below that age and upto tenth year it is near about three to four percent. In traumatic cases about fifteen and in persons over seventy years of age the death rate is about forty-six per cent.

TREATMENT

Treatment may conveniently be considered under five following headings—

- (1) Prophylactic measures
- (2) General treatment
- (3) Local measures
- (4) Dietetic lines
- (5) Effective but very simple recent treatment

Prophylaxis It is advisable to isolate all patients since there is risk of transmission by contacts. This is specially indicated for the sake of preventing spread to puerperal women and newborn babies, and persons with open wounds and debility.

In Hospital Wards In the hospital they should also be isolated, if possible in a special ward. To prevent spread through the desquamating epidermis, a three per cent boric acid bath is advised.

Relapse Measures should be adopted to limit not only the spread of the disease, but also for the prevention of a *relapse*. Relapses are probably due to auto reinfection or a reinfection from outside sources.

The dressings, the fingers, pus or secretions and excretions, bed linen, clothes as a matter of fact all articles which come in contact with the patient, should be disinfected and dealt with properly.

Doctors, nurses, attendants should all be careful of themselves and try to prevent the spread through them to other patients and healthy persons.

GENERAL MEASURES

Bouels should be opened up by fractional doses of calomel say, six one-fourth grain doses every hourly to be followed up by mild salines like Seidlitz powder, or sodium sulphate in suitable doses.

Sponging of the body with tepid water every twelve to twenty-four hours is of comfort to the patient. If bedsores threaten, rubbing of the parts with methylated spirit and then dusting with powder may prevent its development.

Water Plain water, alkaline drinks should be pushed as much as he can take, if his general condition is too low to ask for it, water

should be exhibited orally, every half an hour. In bad toxic cases subcutaneous and rectal methods may have to be taken resort to. The patient should receive enough water to pass about fifty ounces of urine in twenty four hours.

Heart and circulation. Enough of water in the form of saline, orally, subcutaneously, rectally, or in urgent cases per vein may have to be given. When the blood pressure is low saline with five to ten per cent glucose may have to be administered subcutaneously. Twelve and a half to twenty five per cent of glucose per vein may be useful. Concentrated glucose intravenously and half the number of units of insulin as in grams of glucose given subcutaneously may be of great help to keep a weak myocardium going.

Alcohol. In debilitated old subjects, specially, when habituated to alcohol this may have to be given without dilution in two drachm to half ounce doses, every three to six hourly according to its effect on the pulse rate, blood pressure and myocardium.

Strychnine and Digitalin in one hundredth of a grain to one sixtieth of a grain of each may be injected subcutaneously with advantage when the pulse is quick, feeble and a generalised weakness is threatening. Recently strychnine in one fortieth of a grain doses subcutaneously has been used with success. *Solucamphite* with its various combinations, in five c.c.m doses intravenously may prove of help.

Iron and Quinine. According to Anders² best results are obtained from frequent administration of quinine and iron. They may be given in twenty to thirty drops of tincture ferri perchloride and about two grains of quinine bishydrochloride and are to be given every two to three hourly till about four to eight doses are taken per day.

Sera and Vaccines. Vaccines along with serum may be given with the idea of conferring an active immunity by the former and passive immunity by the latter. Until the modern treatment by sulphurimide group of drugs was introduced erysipelas antiserum (antitoxin) given intravenously was one of our main stays in the treatment.

The concentrated antitoxin is given, intravenously, by testing the sensitiveness of the patient to horse serum, as precautions against anaphylaxis in twenty to fifty c.c.m doses every twelve to twenty four hours according to indication.³ In comparatively less severe cases the antitoxin may be given intramuscularly. The injections are to be repeated till the erysipelatous blush, oedema etc disappear and the

2 Anders (1924) *Erysipelas* Osler's Modern medicine Vol I p 565 Lea & Febiger Publication

3 Symmers and Lewis (1927) *Erysipelas* Jour Amer Med Assoc 89 p 890

temperature comes down to normal. Sometimes one injection may accomplish this, but in severe cases three or more may have to be given.

Vaccines Subcutaneous injections of hemolytic streptococci in stock vaccine, preferably autovaccine may be given every twenty-four to thirty-six hours commencing from an initial dose of twenty million organisms, the subsequent doses being of double the strength of the previous one. Thus treatment appears to be of use specially to prevent recurrences of the disease.

Convalescent serum or transfusion of convalescent blood Patient whose temperature has come down to normal about a week back may serve ideally the purpose of the donor. After proper grouping the patient may receive twenty five to fifty c cm of the convalescent blood every twenty four hours, or the transfusion be supplemented by antitoxin treatment. About ten to twenty-five c cm of convalescent serum may also be given with advantage. Hoyne⁴ (1935) however did not find convalescent serum of any use. But the recent very effective treatment by sulphanilamide has done away with all these complicated methods of treatment.

Intravenous mercurochrome

Three to five c cm of a 0.5 percent solution of mercurochrome may also be tried with advantage.

Sulfarsenol Barre⁵ (1935), advocates four daily injections, subcutaneously or intramuscularly of this preparation beginning from twelve centigrams and increased by six centigrams according to the state of disease, age, sex and condition of the patient.

Symptomatic High fever, insomnia, discomfort and pain all require to be combated in the usual lines. Cool sponging, analgesics, sedatives etc are indicated according to the state of illness, general condition, state of cardio-circulatory mechanism and so on of the patient. In bad cases morphine one fourth to one eighth gram with atropine may have to be given.

Local measures

Saturated solution of Magnesium Sulphate This is used as cold compress, and better covered with oil silk, and it should be renewed every two hourly.

Ichthiol A twenty percent ointment of ichthiol in lanolin may be applied locally.

Collodian A strip of collodion applied round the edge of the spreading margin of the syphilis, soon gets dried and the spread of the inflammation may be checked.

⁴ Hoyne, (1935) Med Record 141 p 132

⁵ Barre, (1935) These de Paris, (1935) No 57

Injection by infiltration subcutaneously of the antitoxin around the spreading margin of the inflammation may arrest the march of the disease

Antitoxin Cream or Jelly Local application of this is of use according to Hoynie⁴ (1935)

Diet As there may be profound asthenia in protracted cases the question of diet is of import

At the beginning plenty of water in the form of cold drinks, barley water with salt and lemon juice, aerated waters, ice cream, pre digested peptonised milk, tea, broths etc may be of use. Plenty of glucose orally or subcutaneously or intravenously is to be given. In bad cases rectal methods of administration are to be taken resort to. In elderly patients brandy or any other form of alcohol may be given in one to two drachm to half an ounce doses every four hourly. This is of value specially in persons who are habituated to drink.

During the convalescent stage and during the whole course of the disease a tonic containing iron arsenic and strichnine and a suitable purgative should be given. Gradually solid food like smashed potatoes with egg, custard pish pash, rice and lentils boiled to thin consistency may be taken with butter and fish etc. Plenty of fruit juice due to its vitamin content is of use in these inflammatory processes.

Vitaminous tonics The diet of the convalescent patient should contain all the vitamins and minerals and also should be rich in proteins. Vitamins A and C appear to be of special use. Ferradol or syrup iminadex may be useful.

*Ultra violet rays*⁵ Generally the patient is exposed at a distance of about eight inches and upto double the time required for the erythema dose. Usually four minutes' exposure at the beginning gradually increased up to ten to twelve minutes is enough. The zone exposed should be one inch beyond the margin of the inflamed area. One exposure was often effective, in some cases two exposures at an interval of a day was enough. The usual precaution of putting on black eye-protectors etc should be always observed.

Injection of milk protein Beginning from two c.c.m increased upto five or ten c.c.m intramuscularly in to the buttocks on alternate days or even daily is advocated.

Roentgen Ray Very recently Sounauer (1936)⁷ has reported very favourable reports from X-ray exposure specially in children. As a rule improvement followed within twenty four hours of irradiation. This according to some skin specialist is of great use in erysipelas.

⁶ Lavender and Goldman (1935) Jour Amer Med Assoc 1935, 103 p 401

⁷ Arch F Kinderheilk, (1936) 107 p 225

Sulphanilamide group Huguennin (1935)⁸ treated seventy three cases with sulphamido-chrysoidin hydrochlorate, with great success Recently Snodgrass and Anderson (1937)⁹ reported very successful treatment of three hundred and twelve cases with prontosil exhibited orally with very gratifying results They conclude "The benefits due to prontosil in erysipelas are statistically assessable and are great enough to render the use of such drugs advisable, but the action cannot on the whole be termed dramatic"

Prontosil album was given by these workers orally in 0.3 gram tablets, one, two or three such at a time every four hourly until the temperature came down The average dosage required was near about five grams The minimum was 1.2 and maximum of fifteen grams In ten cases intramuscularly one and a half gram doses were given

The present writer has treated one case of erysipelas in an infant of twenty eight days with a temperature of 104.F with involvement of the vulva and the lower abdomen by the injection of prontosil red) four c.c.m daily, by two such injections one each on successive days, and simultaneously by oral administration of prontosil album in half tablet doses thrice daily, with success It is a very effective and simple form of treatment This group of drugs so'd under various patent names, such as sulphanilamide, prontosil streptocide bactericide, coecocide, and such others, act like specific in erysipelas, notably in children

Sulphur, sulphates of all salts eggs are contraindicated during or immediately before sulphanilamide treatment as they cure sulphremo globinæmia¹⁰ and some times, rather rarely, agranulocytosis,¹¹ is produced by sulphanilaunde¹²

⁸ These de Paris (1935) No 810

⁹ Brit Med Jour 1937 July 17th p 101

¹⁰ Paton and Eaton (1937) Lancet May 15th p 1157

¹¹ Young (1937) Brit Med Jour 17th July p 103

¹² For details of sulphanilamide therapy see my recd p 461 to 470 Medical Annual (1938)

Injection by infiltration subcutaneously of the antitoxin around the spreading margin of the inflammation may arrest the march of the disease

Antitoxin Cream or Jelly Local application of this is of use according to Hoyne⁴ (1935)

Diet As there may be profound asthenia in protracted cases the question of diet is of import

At the beginning plenty of water in the form of cold drinks, barley water with salt and lemon juice aerated waters ice cream, pre digested peptonised milk tea broths etc may be of use. Plenty of glucose orally or subcutaneously or intravenously is to be given. In bad cases rectal methods of administration are to be taken resort to. In elderly patients brandy or any other form of alcohol may be given in one to two drachm to half an ounce doses every four hourly. This is of value specially in persons who are habituated to drink.

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suitably selected near a birth room, is a good place, the hot sun and strong wind, being protected from, by suitable thick screens Open air is very useful and should be insisted on, particularly in cases where there is a possibility of respiratory involvement

The patient should be made free from all anxieties not only of the illness but also of his office responsibilities etc, because worry acts through the sympathetic nerves and may handicap the patient by

CHAPTER XX

SEPTICAEMIA OR SEPSIS AND PYAEMIA

Diagnosis.

Common Signs and Symptoms. The commoner signs and symptoms are usually intermittent pyrexia the patient may feel exhausted but the mental state may be optimistic Sweats quick pulse chill or rigor steadily progressive anaemia leukocytosis the smaller the count the worse being the outlook loss of weight pain all over the body and specially in the joints etc are important systemic manifestations

In the presence of an infection whether the local lesion is obscure or not, the diagnosis of toxæmia is not difficult The severity is greater when the pulse is rapid and there is delirium muscular tremors incontinence tympanitis meningitis petechial rashes² stupor all indicating very marked intoxication

In old and weak persons there may be a deceptive clinical picture the toxicity of the infection in fact is more serious than the severity of the symptoms would seem to indicate These are usually found in weak debilitated persons of post middle age or in the elderly or may be diabetics alcoholics, tuberculous and specially with ascitis due to peritonitis of tuberculous origin, subjects of cirrhosis of the liver chronic nephritis heart trouble cancer, etc and as a matter of fact all debilitating conditions may render the body incapable to put forth a good fight when overwhelmed by virulent infection

Though the differentiation of septicæmia and pyæmæ from pure and simple toxæmia is of importance clinically yet it is difficult and often impossible without blood culture except in those case where secondary localisation indicative of invasion of the general blood stream is evident Repeated careful blood cultures in suitable media with proper technique are important diagnostically

In the presence of a local suppurative lesion dissection or autopsy or other wounds post partum endometritis otitis media or in any pus under pressure and various other septic foci hidden or apparent or during the course of an acute infectious or septic disease there develops a sudden exacerbation of the severity of symptoms in general specially if accompanied by a chill, and sweat at defervescence the onset of bacteræmia is probable Blood culture, if repeated several times is the best diagnostic aid in such suspicious cases, though a negative cultural finding does not necessarily minimise the clinical importance of such a case Increase of polymorphonuclear leukocytes in the course of the disease may help by suggesting an additional burden on the system over and above the existing ones

preventing the body from forming adequate defence against the serious sight. Competent nursing, to conserve the energy, in case the sight is long and protracted, and also for proper following up of the directions of the doctor, are of use. For this purpose intelligent batches of school boys in rotation, where trained nurses are lacking, having taken adequate preventive measures, have proved of good service.

Light The spirit of a normal person gets damped in darkness whereas with the advent of the much expected morning sun the patient gets a sense of relief, cheerfulness and not uncommonly a sense of hopefulness. Most of these cases of sepsis get worse in the evening and at night to improve in the morning. The joy at the sight of the morning sun, is hence, not inconsiderable. This consideration is again of greater significance in persons who are suffering or are to suffer for a long period. In these cases suitable selected places whence the sun can be seen, appear to make a difference in the patient's outlook and suffering.

In suitable cases a few minutes of exposure directly to the morning and evening sun specially in the winter, may not only prove gratifying to the patient but by activation of ergosterol under the skin, the balance of proper calcium phosphorous metabolism may be adjusted. The rays of sun have a well known direct germicidal effect.

For bed etc consult typhoid fever

Fluids Adequacy of fluids tends to keep off the more serious symptoms. Generally three thousand and five hundred c cm of water is the necessity of an individual, two thousand c cm for evaporation from the skin and fifteen hundred c cm for urine.³ Hence this amount must not only be granted but the extra quantity required for tissue metabolism and other oxidation purposes, should not be lost sight of. Additional amounts are imperative in cases with either diarrhoea, vomiting or haemorrhage. In the first two conditions the specific gravity of the blood may form a guide as to the amount of fluid or saline to be given.

Fluid should be given in the form of cool plain water, which is very gratifying to the febrile patients. Milk, aerated water, lemonades, fruit juice, glucose water, sugar candy water with lemon juice, the latter tends, due to its citric acid content to increase the output and

digestive system, including the liver, divided doses of hydrarg subchlor say gr $\frac{3}{4}$ to 1-, every hourly with double the amount of soda bicarb, four to six such, are usefully exhibited in the evening, followed next morning by a saline purge like half to one ounce of saturated solution of magnesium or sodium sulphate

Mild aperients like phenolphthalein in one to two gr doses or glycerine suppositories or glycerine enema or only soap or plain water enema are indicated in weak or debilitated subjects. But in these cases the initial cleansing of the bowels is certainly of greater use to the patient than a conservative bowel movement.

Caution for suspected appendicitis Here a note of caution needs be sounded. In any case with the least chance of the disease being appendicitis, religious care should be taken not to exhibit any purgatives, because the mortality rate in cases so treated is much higher than in those who have had no preliminary purgation. Hence always one should withhold purgatives very carefully in such cases.

Diet While cases of virulent sepsis run a rapid course and are accompanied with anorexia making feeding difficult, food need not be forced in such unwilling subjects. Fruit juice cooled glucose water with lemonjuice or barley water properly salted and soured with lime juice, with or without soups made from vegetables or lentils, given at frequent intervals may be liked. Soups tend to cause diarrhoea, and should not be exhibited to patients having loose bowels or showing much tympanites and so on.

In cases of some duration the theoretical need of at least three thousand calories should be considered. Milk preparations eggs, bread, cereals broths soups sweetened drinks, or preparations with butter or cream add to the caloric requirement of the individual. But it should be remembered that sugar, fats and soups may cause intestinal troubles and diarrhoea by upsetting digestion in some cases, where they should be withheld.

Amongst Indian preparations—"Chira mondo" or "Khoi mondo" semiliquid preparations made from flattened or fried paddy or soft boiled rice with gruel sago where constipated with milk, or barley water and milk, fruit juice etc may be given.

Later on when the patient's appetite and taste for food return one can give, some soft rice boiled, with live fish, or chicken (pish pash) or rice or bread, buttered or simple, eggs, fish, meat, butter milk, soups, smashed potatoes. When there is no contra indication, cold drinks ice cream made at home and when it is beyond suspicion of bacterial contamination, are suitable.

As is generally encountered, when the patient cannot take much at a time, it is suitable to feed him every two to three hours. The service and preparation should be to the taste and liking of the individual.

For children, puddings, baked custard, soft rice with gruel with minced meat, soups, jellies, *pish pash* etc., are suitable.

For care of the mouth, tongue, teeth, skin, eyes etc. the corresponding chapters on typhoid fever should be consulted.

Surgery The original focus should be found out and properly drained. Any surgical intervention to drain the septic foci or for any such purpose should always be our first object to seek. These are the conditions in which the opinion of a surgeon is of good service.

Sulphanilamide group Since the introductions of these group of remedies, puerperal sepsis,⁴ erysipelas⁵ and in fact all forms of streptococcal infections⁶ are more or less successfully treated. Meningo-coccal,⁷ gono coccal⁸ cases, do not matter where the site and nature of infection is, bacillus coli,⁹ and proteus, aerogenes infection of the urinary¹⁰ tract, specially in children, are also reported to have been successfully treated by adequate doses of this recent preparation.

For the details of dosage toxic symptoms and so on, the chapter on sulphanilamide treatment of gonorrhœa may be consulted. During sulphanilamide treatment no other medicine should be given, and the tablets taken after full meals along with glucose alkalies and others. Injections of similar compounds are also given with efficacy.

In diphtheria infection, not uncommonly, the fever does not come down completely after adequate serum therapy. Here the superimposed streptococcal infection demands treatment by sulphanilamide, or antitoxin or by both.

Mercurochrome In cases of sepsis of the blood, an one percent solution of mercurochrome, freshly prepared, given intravenously has been advocated. An injection of twenty three c cm of this solution is the maximum that can be given on the first day. Later according to body weight, five c cm of the same one percent solution the next day, again next day five c cm of a half percent solution, then three and a half c cm of this solution (half percent). But the dosage should be guided by clinical observations. The solution is by itself

4 Colebrook and Kenny, (1936) *Lancet* 1936 i p 1279 *Ibid* 1936 ii p 1319

5 Harvard (1937) i, p 1273

6 Lucas (1937) *Brit Med Jour* 1 p 557

7 Schwenkler and others (1937) *Jour Amer Med Assoc* 108 p 1407

8 Dees and Colston (1937) *Ibid* p 1835

9 Huber, (1936) *Munch Med Woch* 83 p 2014

10 Klein, (1936) *Med Klin* p 910 1936

sterile, but the crystals or the tablet should be dissolved in sterile redistilled water, and need not be boiled.

Reactions after injections are chill and even lasting rigor. There may be headache, vomits, rise of temperature followed by a drop. Salivation and stomatitis are not uncommon.

It is always safe to see the effects of smaller doses say five c cm of one percent solution intravenously, then to try bigger ones. But some say that the reactions are useful.

In all cases of serious sepsis this drug may be tried and some of the American workers are in its favour. Aluminurin or exists in the urine are rather risky conditions for this therapy, as there will be slower excretion and risks of poisoning are correspondingly great.

Melaphen usual initial dose is ten c cm intravenously on alternate days, one in thousand solution in redistilled water it must be chemically pure. Some have given upto twenty c cm but it is often followed by a reaction which may appear, besides, others as jaundice, renal irritation, gastro intestinal troubles etc. The injections are to be given intravenously through a very fine needle and that very slowly.

Intramuscular injection of Colloidal Manganese Manganese butrate half to one c cm in cases of localised specially superficial staphylococcus infections, reduces pain and appears to improve cases sometimes materially and is worth trying. Kolloid stannomanganese (I D II) is useful for these purposes.

Staphylococcal All sepsis caused by *staphylococcus* is usually fatal, and generally no treatment may be of any use

Cases of acute type indicate staphylococcal antitoxin in adequate¹¹ doses and when the acute symptoms subside, active immunisation by the subcutaneous¹² injections of toxoid may be of benefit

Vaccines Preferably autogenous when given intradermally may be of use in staphylococcal infections. Usual dose to begin with is fifty to hundred million or more, at suitable intervals of about two to five days. The next doses being double of the previous ones, (see also immunity, serum and vaccine therapy)

Staphylococcus Toxoid has proved to be a useful agent in the treatment of all staphylococcal infections either of the skin or generalised. *Staphylococcus* antitoxin is the therapy of choice in acute states, to be followed up by small doses of toxoid injections given subcutaneously or intradermally every second to the fifth days. Ramon's anatoxin is useful in skin lesions caused by *staphylococcus*

Nonspecific Protein therapy has recently been much advocated in various subacute or localised septic states

The most commonly used agent is milk protein, sold under various trade names like solan lactoprotein lactosol etc. Typhoid vaccines or other agents producing pyrexia have also been used for such non-specific purpose

Circulation For circulatory failure the same line of treatment as is advocated in pneumonia and typhoid fever is called for

Symptomatic treatment

Fever The severity of fever and toxæmia generally depends on (1) virility of the organism, (2) volume of infecting agent (3) virulence of the bacteria, (4) vital resistance of the individual and so on

The temperature may be continuously high with slight variation, or may show wide excursions accompanied by rigors sweating and anæmia, specially in pyæmia. But it is relatively low in the more chronic and less severe cases

Hyperpyrexia though not very common yet a temperature of 104° to 105°F with all its deleterious effects is met with. For this cool sponging, or alcohol rub, or ice cradle is of use. But in protracted cases cold pack or ice sponging may have to be taken recourse to

When the rise of temperature is initiated by a chill, hot drinks or heat applied in the form of hot water bottles, or electrical devices are comfortable to the patient

Sweats, which may be even drenching, demand warm sponging with alum water, changing of clothes and proper dusting with suitable powders

Sudden Collapse Hot water bottles hot drinks diffusible stimulants inhalation of ammonia, may be all that are required in mild cases. But in serious conditions intramuscular injection of half a c.c.m adrenalin chloride, or camphor in ether, or caffeine sodium benzoate or strichnine $1/64$ to $1/16$ gr may have to be used hypodermically according to the indication of the case. Coramine in $1/7$ c.c.m subcutaneously is of value with respiratory embarrassment or used orally also coramine is of service

Vomits may be only encountered initially, to stop by itself later on. But when intractable the measures for allaying vomits as in cholera and blackwater fever should be taken resort to

Nervous System —

Delirium may be low or muttering noisy, or like typhoid fever with coma vigil and so on

As it is an indication of the severity of the toxæmia all measures which help to eliminate the toxins such as fresh air, cold sponging, sufficiency of food and particularly abundance of water are of primary importance. Plenty of water should be given by all means we can employ. Continuous venoclysis, Murphy drip rectal or subcutaneous saline injections, have got to be resorted to

Ice cap, on the head often ameliorates a noisy delirium, and is worth trying in all cases of active noisy delirium. Where ice is not available a towel, or four to eight folds of a thick cloth wrung out of cold water may be wrapped on the patient's head and vigorously fanned with a hand fan. This is to be repeated as soon as the cloth on the head gets warmed up. It has been found by the present writer to be of use in distant villages and out of the way places. If the hair on the head is unmanageably long it is advisable to crop them very short, as frequent washing of the head, say every two hours, with cold water, may be of comfort.

The patient should never be left alone lest he injures himself. In the wild delirious cases restraint becomes necessary. Careful device either by fastening the hands and feet, or by infolding the bed clothes down by the side of the bed and at its bottom, thus making a sac for the patient, may be of use too. The extremities must have to be fixed down by knots made of suitable material, bandage cloth being useful for the purpose.

Insomnia Bromides in ten to thirty grains or in bad cases with equal amount of chloral hydrate may be given late in the afternoon. But more recent hypnotics of the barbituric acid group such as dinal in 1¹/₂ gr veronal five grs, sodium barbitone or medinal in same dose, phenobarbitone or luminal—in half to two grs, or phenobarbitonum soluble or luminal sodium in half to two grs are useful. The last preparation being soluble can be used as an injection with good effect.

Though the above hypnotics should generally prove sufficient, where the pain is agonising morphine 1/6 gr combined with atropine 1/400 to 1/200 gr respectively, or morphine alone hypodermically is indicated. Cocaine phosphate in 1/4 gr hypodermically though less effective than morphine, may be also tried.

Hycoscine hydrobromide in 1/100 to 1/200 gr hypodermically may have to be used when morphine is not well borne or causes excitation. But the writer has seen at least one case in whom hycoscine hydrobrom in 1/100 gr to 1/200 gr given hypodermically instead of quieting the patient used to make her noisy and excited. So every case should be carefully individualised.

When the patient cannot sleep due to high temperature, a tepid or cool sponging, with an ice cap on the head may do much. If he is kept awake by chilly sensation, hot drinks, hot water bottles in the bed or at the feet, care being taken in patients who are either unconscious or under hypnotics, not to scald the skin, may be gratifying. This type of injury by hot water bottle, unconscious or semi conscious patients is not rare, and this should always be borne in mind.

Headache For this the probable underlying factors should be remedied whenever possible. If the headache is due to meningitis or excessive toxæmia their mitigation is the line of therapy. When the trouble in the head is due to low circulatory pressure, the foot end of the bed may be raised. If due to higher pressure ice cap on the head and raising the head end of the bed may prove of some assistance. Nitroglycerine in 1/50 to 1/100 gr to adults and 1/200 gr to a boy of five years every two hours, in hyper tension may do good. Verumon compral in three to five gr doses and other such preparations are useful, but their effect is usually temporary.

In convulsions treatment should be according to the cause. Chloral hydrate and sodium bromide twenty to thirty grains each given rectally in four to six ounces of normal saline often tend to relieve the convulsions.

When the headache and the convulsions are due to excess of toxins plenty of water by all the possible routes to facilitate elimination, may be useful. Here too the amount of urine passed is a rough and ready guide as to the adequacy or inadequacy of internal hydrotherapy. When a person in health should pass about fifty ounces of urine certainly the same amount of fluid and the additional amount required for metabolism evaporation and insensible perspiration should be granted. This is a drawback and not uncommonly the cause of higher death rate in cases of high toxæmia treated outside the hospital.

Convalescence This should be managed as in enteric fever or other illnesses of long duration.

CHAPTER XXI

TETANUS

Complications Such as pneumonia and nephritis may occur During the sudden convulsive seizures rupture of muscles and consequent haemorrhage have been reported

Types and Varieties of the disease may be of a chronic type besides the acute ones Chronic cases develop less abruptly and are less pronounced cephalic tetanus is not so common Lastly tetanus neonatorum is that form of the disease which affects new born babies This is due to uncleanly handling of the chord

Differentiation is to be made from strychnine poisoning by finding the symptoms to develop in a short time after ingestion of the drug Convulsions are noted from the very onset in between these seizures there is complete relaxation and the course is brief There is generally gastric disturbance and contraction of the extremities Hyperesthesia of the retina is common objects not uncommonly look green Tetany hysteria hydrophobia cerebrospinal meningitis have often also to be differentiated from this disease

TREATMENT

This is divided under two headings

(1) *Prophylactic* Consisting of certain initial measures of cleaning which all wounds specially of lacerated and crushed type with the least possibility of being contaminated by soil, manure or street dust, dirt and others, demand All compound fractures deserve this line of management In tetanus adequate prophylaxis is by far the most important, effective and not uncommonly a life saving procedure

(2) *Cure* Once the symptoms develop and the diagnosis is suspected a line of treatment is taken which may not prove so successful as an adequate prophylactic measure is likely to be Hence the importance of proper prophylactic measures in all suspected injuries wounds, cuts, bruises etc Street injuries are specially dangerous

Prophylactic Measures The wound should be washed, irrigated, the foreign bodies or crushed bones, or dead tissues removed, drainage ensured and adequate dosage of antitoxin given As the limit of the incubation period may extend upto three weeks, and the protection conferred by serum usually does not last for more than the maximum limit of about twelve days¹ though most workers hold that the protective action of serum does not last for more than seven days, it is advisable to give three weekly injections of fifteen² hundred American units of the antitoxin (American units are double those of international units) A serum of a dependable brand is nowhere so essential as in the prevention of this very dangerous disease And no where, prevention is better than cure, as in this condition Recently Brown (1937)³ has suggested active immunisation by injection of toxoid, or alum toxoid

1 Miller and Rogers, (1935) Jour Amer Med Assoc 104 Jan 19th p 186

2 Klopp (1930) Ann of Surg 104 p 419

3 Brit Med Jour 1937 1, p 491

CURATIVE —

General A somewhat darkened but well ventilated quiet room should be chosen as sudden noise, loud talks hanging of doors or utensils, heavy foot steps, are likely to precipitate these distressing clonic spasms, hence every effort should be made to exclude them. A soft hospital type, preferably a waterbed is of comfort. Warm baths and sponges should be undertaken very cautiously, as cold water may initiate the convulsions.

Feeding is not uncommonly very difficult and concentrated food such as egg milk and glucose mixed together, fruit juice with glucose etc may have to be given later on, by the nasal tube. Rectal saline and glucose may be of service. But while feeding much care should be exercised to prevent suction of food materials to the respiratory passages and thus development of aspiration pneumonia prevented. As the patient's strength is of great use for final recovery all effort should be made to conserve the energy by rest, prevention of spasm and good dietary and so on.

The Wound This should be treated on the principles of septic and antiseptic surgery draining ensured, and dead or lacerated tissues or foreign substances removed. Tincture iodine, hydrogen peroxide carbolic acid touch etc, irrigation, drainage are of value. Once the symptoms are there, amputation of the limbs or the parts is useless as the toxin is already fixed in the nerve tissues and though amputation may prevent further absorption of the toxin, yet the amount already absorbed by the system may be fatal. Moreover at the later stages of the disease the bacilli die out, hence again the futility of amputation of the limbs.

Some workers have advocated the local administration of dry tetanus antitoxin into the wound, after it has been surgically cleansed, this is said to be of special use in tetanus neonatorum in which the infection is through the umbilicus.

Micturition and Defecation Owing to the spasm of the muscles of the perineum a catheter may be required for proper relief of the bladder. Much trouble may be experienced in getting a satisfactory evacuation of the bowels.

Antitoxin In all cases where the diagnosis is made serum should be given intravenously and intrathecally. This form of combined treatment affords the best results. Serum given subcutaneously is not effective as compared with intramuscular serum injection, this latter method again is not so effective, as serum administered intravenously and intrathecally.⁴ The concentrated antitoxin has made it possible to administer very large number of units of the serum in a comparatively smaller bulk.

⁴ Yodh, (1937) Brit Med Jour 1, p 880

In every case a lumbar puncture should be done and the maximum amount of cerebrospinal fluid possible to be drained allowed to flow out, care being taken not to drain too much, which may lead to head ache and too low a blood pressure. If nearly twenty c cm are removed, about the same or a slightly lesser quantity of serum slightly warmed should be introduced into the cerebrospinal canal. By this route, in ten c cm bulk, about ten thousand units of concentrated refined antitoxin may be introduced directly nearest to the affected nervous system. This may have to be repeated once or twice daily in bad cases for about three to four days or more, according to the severity of the symptom and gravity of the condition of the patient.

Along with intrathecal serum administration simultaneous intravenous serum therapy should also be carried out. In all cases before administering sera, the sensitiveness of the person to foreign protein should be investigated and care should be taken specially in persons who have received previous injections of horse serum or in the family of asthmatics, status lymphaticus etc.

With due care and proper precautions, concentrated antitoxin, properly diluted in warm sterile normal saline may slowly be given intravenously. The refined concentrated antitoxin may be given in urgent cases undiluted but slightly warmed up. Recently some American workers are of opinion that only intravenous serotherapy is quite good and adequate for the treatment of tetanus. The intravenous route, according to them, is as useful as intrathecal administration. It is difficult to subscribe entirely to this view.

Dosage During the earlier part of the disease the maximum dose of antitoxin amounting even to two hundred to three hundred thousand units should be pushed notably in grave cases. Bruce recommends much smaller doses than we have found to be effective in our patients. Generally about fifty to one hundred thousand units should be given on the first day, the same dose the next day, and then the dosage may be lessened to some extent. Most of this should go intravenously and partly intrathecally. Once the symptoms improve intramuscular injections of twenty to thirty thousand units each may be given daily, in two twelve hourly doses. But in actual practice one has found that enormous doses of serum may be required to combat bad cases of tetanus. It is also worthwhile remembering that once the disease has developed the results of curative treatment may not be so successful as the antitoxin treatment of cases of diphtheria, hence the repeated emphasis on the supreme importance of adequate prophylactic measures. The antitoxin must be of a dependable brand.

During the Convulsions For immediate relief of the convulsion, chloroform anaesthesia of a mild type may prove useful. Some workers

think that chloroform itself has got a curative effect hence should be given daily. But repeated chloroform inhalation, has given rise in a few cases to secondary bronchopneumonia, due to improper breathing and aspiration of infected material from the oral cavity. It is very difficult to keep the mouth clean due to spasms and lockjaw. Where available, gas and oxygen may be given with better results than chloroform.

Chloral hydrate has a depressing action on the anterior horn cells of the spinal cord, lowering their power of conducting the impulses. Hence it is an ideal antidote to this disease. But as chloral hydrate is a depressant to the heart, it should always be used with care. For an average Indian patient about twenty grains of chloral hydrate and thirty grains of *potassium bromide* in four ounces of normal saline may be given high up in the rectum, by drip method, to be followed up every four to six hourly by about ten grains each of the drugs in the maintenance dose.

Curarine Recently Mitchell⁵ (1936) has reported successful treatment of a case of tetanus by subcutaneous injection of one milligram or about $1/16$ gr of curarine free from curine. The solution should be freshly made every few days. It has got a property of lessening the spasms and the reflex irritability⁶. The margin between the effective antispasmodic dose and that which produces paralysis of the muscles of respiration is so narrow, and as the drug's action as a rule does not last for more than half an hour, this drug is not safe to be used by doctors who are not experienced in its use. On the contrary avertin⁷ has been advocated recently in sixty to eighty mg per kilo of body weight repeated every few hours as its effect passes off, and is always worth a thorough trial.

Sulphate of Magnesium Intrathecal injections of about two to four c cm of a twenty five per cent solution of chemically pure magnesium sulphate solution on alternate days are of use in relieving the spasm of cases of tetanus. To be effective this treatment should be started very early in the disease. Twelve per cent and twenty five per cent magnesium sulphate solutions in fifteen c cm doses are given intramuscularly and intravenously respectively, every twelve hours, with good results.

The following summary of Cole (1936)⁸ for the treatment of tetanus is of value, and is worth following:

(1) As soon as the diagnosis is made give two hundred thousand units (international) of the antitoxin per vein.

⁵ Lancet (1935) Feb 2 i p 262

⁶ West (1932) Proc Roy Soc Med 15 p 39

⁷ Medical Annual (1937) Tetanus p 461 to 462

⁸ Brit Med Jour (1936) i, p 1191

⁹ Yodh, (1)

(2) One hour after the antitoxin has been administered proper surgical treatment should be given to the wound and irrigated with hydrogen peroxide

(3) Keep the patient as quiet as possible in a darkened room. If reflex spasms have not begun give large doses of bromide and as much of a fluid or semifluid diet as possible

(4) If the period of onset is four days or longer and the reflex spasms are not severe the treatment by a *ertin* need not be started at once but should be begun if the spasms are severe and exhaustion appears. In such a case one basal anaesthetic dose may be sufficient

(5) If the period of onset is three days or less treatment with *avertin* should begin at once and continued according to the severity of the spasms. In cases of prolonged spasm causing respiratory embarrassment the dosage should be large and frequently repeated

(6) With *avertin* treatment oxygen should be given intranasally by the catheter and atropine injected as required

(7) Enemas rectal salines etc should preferably be given when the patient is under the influence of *avertin*

(8) *Avertin* treatment may be continued as long as necessary, gradually the dosage should be reduced

(9) Cool or tepid sponging is generally useful in hyperpyrexia

Julinke (1937)⁹ referring to the experimental investigations regarding the therapy of tetanus by Siegesser (1935) where the lowest mortality in tetanus has been possible suggests the following methods

(1) Combined intravenous and intra lumbar injection of the serum intra lumbar injection during chloroform anaesthesia (2) combined *avertin*, serum atropine therapy (3) Intraspinal injection of twenty five per cent magnesium sulphate solution in forty per cent glucose (4) Administration of chloral hydrate and somnifene (5) Administration of alkalies, glucose and insulin, with oxygen inhalation

CHAPTER XXII

CEREBRO-SPINAL FEVER

Diagnosis. Over crowding besides others is an important factor in the spread of this infection. Poverty, insanitary living contact with persons having infections of the respiratory tract, overwork, fatigue, exhaustion etc in history are suggestive. In India it is common during hot months and in young adults.

According to Horder² The chief difficulty lies in not suspecting the presence of the disease. With this point one can not but agree, specially this remark holds good at the time of absence of an epidemic.

Clinical Feature. In the study of the clinical features of the disease 'the meningeal phages of meningococcal infection are so dramatic and arresting that they have fixed the attention of the clinician to the exclusion of the study of the more obscure but no less important extra meningeal features. The result has been a narrow conception of the disease as a meningitis only, a late diagnosis and a relatively ineffective therapy'.³

Though the clinical features vary but generally the average case of the disease has got three stages which are

First Stage. This stage lasting for a few hours to several days, manifests symptoms indistinguishable from those of a cold in the head, and sore throat, but may show toxæmia. The throat swab shows plenty of meningococci on culture as yet the infection is mainly local. This toxæmia, absent in ordinary catarrh is suggestive.

Second Stage. This is the stage during which organisms have disseminated to the systemic circulation. This may take place from forty-eight hours to several days or weeks following the primary stage.

The inflammation of the upper air passages, coryza, pharyngitis, tonsillitis and conjunctivitis persists and the oral secretions are thick, viscid and evenropy. The temperature in over three hundred cases was on the average 101.1°. The pulse was rapid and blood pressure low. The patient looks toxic and indifferent to his surroundings with prostration which at times amounted even to moderate coma. Though in this stage the patient resents disturbance and likes to be left alone yet, he answers questions intelligently. These replies are short without play of muscles of expression or modulation of voice. He does not want to spend any energy over it. During this stage children may show reported convulsions. The subjects of meningitis lie listless to their surroundings in a peculiar huddled up posture and on their sides with the knees drawn up and the head bent forwards. There are generally pronounced aches and pains all over the body, sometimes with involvement of the joints. Not uncommonly in the very fulminant cases the patient becomes stuporous and speechless.

1 Russel, (1926) Bull de l'Off. Internat etc 1926 2^e p 1103

2 Horder (1933) Cerebrospinal fever Text book of Practice of Med Edited by Price, 4th edition p 159

3 Herrick (1926) Osler's Modern Medicine, Vol I Chapter 12 Meningococcus infection p 573 Lea and Febiger's Publication

There may be a petechial rash present most commonly, near about the shoulder and the pelvic girdle, and reports by writers suggest a proportional severity of the disease in relation to the severity of these rashes. Hemorrhages under the skin are not uncommon in very severe cases. Meningococci have been repeatedly successfully cultured from these cutaneous lesions.

A very important point diagnostically, with the possible exception of lobar pneumonia is in the early and very definite leukocytosis, varying generally from sixteen thousand to about fifty thousand, of which the polymorphonuclears range near about ninety percent. In no other disease such leukocytosis takes place so early, except in lobar pneumonia which has got its peculiar and own characteristic symptomatology, differentiating one condition from the other.

During this stage there may be a positive blood culture showing meningococci. In ten out of twelve consecutive cases of meningitis in Herrick's series it was found positive on blood culture. The routine technic of the average bacteriologist is seldom successful in isolating this organism. Proper methods are essential for successful culture. Cases might not proceed further than this stage and may terminate either in death but more commonly in recovery without showing any signs and symptoms of meningeal involvement. If diagnosed at this stage treatment can do much hence the stress on the clinical picture of this stage in such detail. Not only this one should differentiate meningitis at this stage from influenza, typhoid fever pneumonia hemorrhagic small pox measles and so on.

Third Stage. Then comes the third or metstatic stage and that in about ninety percent of the cases. The signs and symptoms are characteristic of affection of the central nervous system.

Headache of a bursting nature vomiting which persists even after the acute stage of onset is over, are very suggestive points diagnostically.

There appears by the third or fourth day of disease some rigidity of the neck. On attempting to flex the retracted head on the neck the entire body may be lifted up like a log of wood.

Kernig's Sign. The inability to extend the leg at the knee when the thigh is flexed at the hip is positive.

Brudzinski's Neck Sign. Consists in flexion of the thigh and legs when the head is attempted to be flexed on the chest. On attempting at flexion of the head there is not only active protest from the part of the patient but also there is dilatation of the pupils.

There may be the typical peculiar distressed cry, the socalled hydrocephalic cry.

Of the cranial nerves the third sixth and eighth are commonly affected, leading to variable types of strabismus, this too may help in the diagnosis.

The following are useful diagnostically:

- (a) If delirium and headache synchronise, meningitis is probably present and not mere toxemia.
- (b) If vomiting persists after the initial invasion stage of the disease being undoubtedly over, then there is evidence of meningitis.
- (c) A relatively slow pulse, in the possible absence of typhoid fever, as compared with the temperature, or irregularities in rhythm are in favour of meningitis. Slow pulse is also met with in influenza and small pox.
- (d) Stiffness of the neck, in the absence of any local and painful disease of the neck, meningitis is probable.
- (e) Optic neuritis, is not an

early symptom but fundus may show unusual fullness of the veins and blurring of the edges of the discs and these are important suggestive findings so in short the diagnosis depends on the 1 History, 2 The clinical picture and culture of the throat swab and blood 3 Leukocytosis 4 Syndrome of meningeal involvement 5 Lumber puncture findings, 6 Cytology and cultural result of the cerebrospinal fluid

During lumber puncture—

1 There is increase in the pressure and amount of the cerebrospinal fluid 2 The naked eye appearance of the fluid varies from slight opalescence to a frank purulent character 3 The albumin and globulin-content are much increased 4 The characteristic cytological change is in an increase of lymphocytes quite early in the disease a fact often misleading to the novice and worth remembering later on great increase of polymorphonuclei nearing about 70 to 80 percent 5 Bacteriology of the fluid is very characteristic Direct smear or a centrifuged deposit when stained generally show the typical intercellular diplococci 6 By proper culture of the fluid and thus isolating the organism

It must not be forgotten that lumber puncture is the only sure means of diagnosis, it helps to ascertain the nature of the organism and helps materially in the treatment

Complications—

Hydrocephalus, suggestive points are pallor, cyanosis increased frequency with diminished volume and tension of pulse shallow respiration On percussion over the anterior horn of the lateral ventricle there is resonance associated with headache vomiting recrudescence or not of fever marked emaciation and so on

Psychic and motor defects of various types and affections of special senses may be met with Blindness and deafness may also occur

Arthropathies Arthritis is quite common they are of varying grades of severity, The writer has seen in several fatal cases of meningitis hemorrhagic effusions into the joints

TREATMENT

Prophylaxis The same principles of prophylaxis, as adopted for all infectious diseases spread by droplets, hold good here too Though usually it is more by a healthy carrier that the disease is spread, yet the patient should be isolated and contact with others avoided The average period of incubation is about seven to fourteen days and all contacts should be kept under observation at least for a fortnight Open air life is very suitable to render the contacts and the temporary carriers free from the organisms, thus making them harmless

Contacts may take sprays of suitable mild antiseptics for the nasopharyngeal passages A solution consisting of one in thousand permanganate of potassium having also 15 percent of sodium sulphate added, to help penetration, is used as a local spray or wash, with advantage Spray of the antiserum for contacts' and carriers' nasopharynx may be tried with effect

intense tissue dehydration may be the cause of dry lumber puncture in very serious cases. The details of administration of fluid can be gathered from chapters on dehydration of pneumonia and typhoid fever. Fluids should be pushed all the more as the patient, due to his dull mental state often does not make a demand for it. At least five to eight pints in food and drink etc are required for a young adult. For children proportional amounts should be granted or forced in, according to their physical and mental condition.

Diet This should be limited to liquids such as fruit juice, milk preparations glucose water green cocoanut water, dry milks properly prepared and so on. When there is desire and according to the taste and liking of the patient smashed potatoes custard icecream, cereals, soft boiled rice tea coco etc may be allowed.

As there is much loss of weight due to the fever, toxemia etc and also in view of the fact that the course of the disease may be prolonged due to relapses one must try not only to keep up the nutrition of the patient but also try to conserve energy by giving the patient proper and adequate rest and by good nursing which spares all efforts.

Bowels, should be moved by either purges given early in the course of the disease or by enemata or glycerine suppository in the later asthenic stages. A daily evacuation of the bowels or atleast on alternate days may be helpful to the patient.

Retention of Urine Specially in unconscious patients catheterisation with strict sterile precautions may be required. Hexamine and ammonium chloride in ten grains each may prevent cystitis and such like common infective complications. These should invariably be given in cases specially running a prolonged course.

Treatment at the Carrier or first Stage Generally about two percent of the convalescents become chronic carriers, and nearly twenty per cent harbour the organisms for near about three weeks. Fresh air, sunlight and dry atmospheric conditions deep breathing exercises keeping the resistance of the system at its optimum level by foods vitamins etc are of use. Spraying the throat and nasopharynx with antiserum or mild antiseptics may or may not do good. But sometimes violent local surgical interference may drive the organism into the circulation, leading to disastrous results hence they should be avoided at this stage. A carrier should invariably be isolated.

The Second or the Septicemic Stage During this stage the best results are got by the intravenous injection of adequate doses of the antimeningococcus serum properly diluted with warm formal saline.

But as in all cases of serum administration here too on no account one can afford to forget to test the sensitiveness of the patient to

horse serum. For this, the chapter on serum reactions etc. is referred to.

When the ordinary combined anti bacterial and antitoxic sera are chosen, during this second stage of the disease, about one hundred c cm should be given very slowly intravenously properly diluted with warm saline, preferably with glucose, ten to twenty five percent. This will have to be repeated every twenty four hours according to the condition of the patient.

But lately the purified anti toxin against meningococcus has made the outlook brighter. The details of this are given under the treatment of the syndrome of involvement of the meninges and the central nervous system.

Recently the sulphanilamide group of remedies have proved themselves useful.

Treatment of the third or the metastatic Stage. At this stage the patient is treated by the local use of serum in the meninges, pericardium, joints, pleura etc. and it is this stage which most concerns the practitioners. In an average case the lumbar puncture should be done every twelve hours for the first few days, then once a day. The cerebrospinal fluid should be allowed to be drained out till one drop comes to every two to three seconds. Generally twenty to fifty c cm are secured in an average case. Anti meningococcus serum just lesser by a few c cm than the quantity of cerebrospinal fluid withdrawn is injected, slightly warmed up to the body temperature. In an average case one may be able to give about fifteen to thirty c cm of serum intraspinally. Though daily one intraspinal serotherapy is usual, yet in bad cases every twelve hourly relieving of pressure and serum administration, specially, during the serious acute period of the disease may be essential.

Dry Lumbar puncture. Not uncommonly in very severe improperly managed dehydrated cases of undoubted meningitis, at the later stages, lumbar puncture does not bring out any cerebrospinal fluid or only a few drops of thick purulent matter. In such cases not only oral administration of plenty of water is of use, but the recently introduced method of forced spinal drainage may also be of distinct service.

This consists in intravenous administration of a 4.5 per cent saline, about one pint, for an adult. The hypotonic saline has a tendency to permeate into the diseased areas of the system, here the cerebrospinal cavity being the site of inflammation, it can readily find its way thereto. Now if a lumbar puncture is made, it is likely to be of use

by proper drainage of the cerebrospinal cavity wherein the hypotonic saline has permeated

Kubie (1938)⁵ treated meningo encephalitis in experimental cats by washing out of the perivascular exudate in the sub arachnoid spaces, by adopting the above method

Generally in human Parkinsonian syndrome about one to two litres of this saline were used, a whole hour being taken for this intra venous saline injection, and all the time a lumbar puncture needle being kept in the subarachnoid space for a continuous drainage of the fluid. Temporary headaches etc caused by the excessive draining of the fluid was checked by inserting the stilette of the canula in side. Once the headache was thus relieved, again fluid was allowed to drain out

Retan (1937) has reported after applying forced spinal drainage for about two thousand hours on twenty two patients. This line of work may be specially taken up with profit by those hospital workers in India who admit many patients of nerve diseases including cases of meningitis

Cisternal puncture Nowadays in cases where lumbar puncture does not give satisfactory results or for better therapy, cisternal puncture is being utilised. This requires practice and should not be undertaken by any one who is not conversant with it

Ventricular route of serum administration may have to be taken resort to in the cases of children

Encysted Meningitis when inspite of the aggravation of the clinical picture either no spinal fluid is obtained or where the fluid is normal in appearance the condition is, in all probability, due to blocking caused by the formation of meningeal adhesions producing an encysted meningitis. In such cases ventricular puncture for children and cisternal puncture for adults are the only routes to drain the pus from the cranial meninges

Lumbar puncture is an invaluable procedure in meningitis and if done early and the cerebrospinal cavity drained and intraspinally serum administered many cases could be saved. The fear and prejudice against this life saving step, entertained in private practice is not at all justified. It should rank with the exploratory puncture of the pleura to ascertain the presence of fluid therein. In modern medicine, wherever the physician is in reasonable doubt a lumbar puncture is justified. It is the only means of draining out the purulent bacteria laden matter living under pressure in the cerebrospinal cavity. In all cases lumbar puncture should be done regularly, so long as there is

increased intracranial pressure, and till there are two consecutive sterile cultures of the fluid. When the parts are properly anaesthetised by a two percent novocaine solution the patient does not feel much pain, hence this procedure should always precede the puncture.

Combined intraspinal and intravenous serotherapy, is the method of choice in treatment. Beside giving the amount possible per intraspinal route, one should also give about fifty c cm of serum intravenously. Due to the increased tissue permeability of the inflamed parts, it is best to give the antiserum per vein first, this tends to permeate into the cerebrospinal canal and in an hour's time if the lumbar puncture is done, there is the chance not only of a better drainage, but the systemic antibodies and those given intravenously also can easily permeate into the spinal cavity, thus helping the cure.

If much pressure is used in intraspinal serum injection, the patient may complain of headache etc., hence the importance of gently putting in the serum without any extra pressure. A sterile twenty c cm syringe, the nozzle fitting into the mouth of the lumbar puncture needle, may be utilised to gently introduce the serum. This should be done at least once a day in an average case at the beginning of the disease. This may have to be repeated in very bad cases every twelve hours, when the indications are urgent, specially at the earlier part of the disease. When the symptoms and signs justify the intravenous route of serum administration to be suspended, only the intraspinal method is to be continued. The average case generally requires about three to five intravenous and about six to eight intraspinal serum administrations.

When to stop Treatment Though this is not generally easy to decide, yet the clinical condition of the patient and the character of the cerebrospinal fluid are the main criteria. When the fever subsides, mental condition of the patient improves, signs of meningeal irritation lessen and the fluid is clearer with rise of mononuclear leukocytes showing absence of the organisms in the stained smears, better still, failure of growth of the meningococci from the cerebrospinal fluid in suitable media, are all favourable signs and one is justified to suspend treatment by antiserum for twenty four hours and watch the effects. But on a matter of experience, one should prefer to go on puncturing the lumbar region for another two three days atleast, to be sure that there is not a relapse. With the first appearance of the meningococci or an increase of the pus cells in the fluid, the original regime of serum treatment followed at the earlier part of the illness, should be instituted and followed up till a reasonably healthy state is reached.

Over treatment Too frequent and prolonged treatment may induce an irritable condition of the meninges. This may be assumed

when intrathecal serum administration is followed by signs of increased meningeal irritation and unsatisfactory effect on the clinical picture of the case. In this irritable condition due to hypersecretion of the fluid there is though an increased pressure in the cerebrospinal system yet it appears clearer and the mononuclear cells show an increase therein. In the absence of a negative cultural finding, and when in association with signs and symptoms of local irritation one is justified in holding serum treatment for twenty-four or even forty-eight hours provided no untoward symptoms indicating a change for the worse appear. To relieve the headache etc in cases of undue meningeal irritation only draining of the spinal cavity by lumbar puncture is indicated.

Choice of Serum This is a very important factor. The serum to be effective should not only be polyclonal but should preferably also contain antitoxin against the strain causing the infection. Until very recently we had to depend mainly on antibacterial sera, which had to be given both intrathecally and per vein. But recently Hoyne (1936)^{6,7} reported favourable results mainly by the intravenous injections of an antitoxin the lumbar punctures being done only to relieve the pressure symptoms and for drainage of the pus. According to him this antitoxin prepared in Parke Davies research laboratories, available in bulbs of ten thousand units each, when given in twenty to forty thousand units per vein initially, properly diluted with normal saline warmed at body temperature, to be followed up daily by similar or smaller doses gave good results. By this treatment in Chicago in 1933 there was a mortality of 37.7 per cent in 464 cases in comparison with a mortality of 49 to 53.3 per cent in a series of 1378 control cases during the years of 1928 to 1931. But this serum is rather expensive. The choice of the serum is a very important matter and any brand not giving prompt favourable effect should be changed for another dependable one. The antiserum of the Pasteur Institute of Paris is found by the present writer generally useful. But though expensive yet this antitoxin used by Hoyne may be tried wherever possible.

Acute Block There are cases, specially in epidemics where at the early part of the infection due to the combined effect of meningitis and encephalitis the volume of the cranial contents increase to the degree of forcing the brain stem into the foramen magnum. In such cases in order to reduce the volume of the brain, venesection, hypertonic saline are of value. For the latter purpose ten per-cent saline, mixed with five per cent glucose per vein in two to four hundred c.c.m. may be of use. Magnesium sulphate, in fifty percent solution given high

6 Hoyne (1936) Arch Pediatr March 53 p. 164

7 Hoyne, (1936) Jour Amer Med Assoc 107 p. 478

up rectally may help to lower the intracranial pressure. In these cases *lumbar puncture is to be done with the utmost of caution* as a fatal result may follow the impact of the brain stem against the bony canal by sudden lowering of the intraspinal pressure below the block.

Vaccine Wherever possible from the beginning of treatment, the writer uses an autogenous vaccine subcutaneously, after the acute symptoms show amelioration. This is done with the idea of preventing complications and to establish a possible active immunity which may help to clear up the disease early. The first sample of the cerebro spinal fluid giving a positive culture is utilised for the preparation of vaccine, and injections begin subcutaneously usually from doses of ten to twenty five million organisms every alternate days. The doses are usually doubled in the succeeding ones.

Sulphanilamide Schwentker⁸ and others⁹ (1937) have treated eleven cases of meningococcal meningitis by a 0.8 percent solution of sulphanilamide in normal saline intra spinally the same quantity of it as is used in the case of serotherapy that is about ten to thirty c cm and subcutaneously hundred c cm for each hundred pounds of body weight. Both these methods of sulphanilamide therapy should be repeated every twelve hours for the first two days then once a day till improvement follows. According to them it is as good as meningo coccus antiserum.

Complications should be treated by systematic serum treatment as well as, by local measures.

Hydrocephalus demands tapping of the ventricles by persons having experience. When this procedure is followed by the introduction of antimentingococcal serum or the antitoxin some amelioration may follow. An experienced surgeon may be of great use in these operative procedures. For the details of this operation etc special monograms and books are to be consulted.

Convalescence The patient should be carefully isolated till the carrier stage is over. For rendering him free of the carrier stage an open air life tonics anti anæmic nutritious products like ferradol syrup minader, codliver oil food containing fruits milk eggs butter meat vegetables etc in suitable quantities according to the appetite desire and liking of the patient are useful regimes helping a speedy recovery and cause a rapid gain in weight and thus shorten the period of convalescence. Change to a better climate may help to hasten up recovery.

⁸ Lancet (1937) Editorial May 19 p 1103

⁹ Puum, (1937) Lancet January 2nd p 18

CHAPTER XXIII
ACUTE ANTERIOR POLIOMYELITIS

rate of extension from one stage of the disease to the other. The abortive cases seldom advance beyond the first or second stage. The so-called polo-encephalitis is almost certainly due to some agent other than the virus of poliomyelitis^{5,6}. The fever seldom lasts for more than seven days. It may usher in with chill in adults and convulsions in infants and children. The first type of paralysis more commonly of the legs than of arms begins generally from the end of the first week and recovery may not start usually before the end of third month. Those cases which retain tendon jerks inspite of the paralysis usually recover completely. In variability of symptoms this disease stands unique. There might not only be symptoms due to involvement of the spinal cord, cerebrum or meninges etc. and a combination of these may be also encountered.

Differentiation has got to be made from acute joint pains due to rheumatic arthritis which may simulate paralysis of acute anterior poliomyelitis but the superficial and deep reflexes are brisk in rheumatic fever but are absent in poliomyelitis. Acute febrile polyneuritis or Landry's paralysis has a spreading tendency and there is no marked lymphocytosis in the cerebrospinal fluid or a leukocytosis of the polymorphonuclear type in the blood in Landry group of troubles. From other conditions such as haematomyelitis, acute myelitis or in troubles of slow onset such as tumours, inflammation or pressure the distinction is made by the absence of sensory loss and sphincter trouble in poliomyelitis both the latter changes are generally present in the above pathological states. Deformities and contractures are more common as the late results of poliomyelitis than as sequelae of any other disease.

TREATMENT

Prophylaxis In the acute stage the patient should be isolated and all precautions against droplet infection adopted for atleast a fort night, after the subsidence of the temperature to normal. There may be encountered a variety of manifestations of the same disease in different persons of the same family, hence the importance of keeping all cases isolated. Recently much work is done on the preventive value of one per cent zinc sulphate solution⁷ applied to the nose. It is a good prophylactic.

For convenience, the treatment is divided under three stages.

Acute Stage The patient should be kept in an airy well ventilated room, resting in bed all the while in the most convenient and comfortable posture. As in all other acute febrile conditions the diet should consist mostly of fluids. Plenty of liquid drink is useful. In the presence of acute pain during movement a water or air bed, and immobilisation of the limbs by splints may be of distinct service. Application of warmth may give the patient considerable relief. Pains and aches are favourably influenced by either aspirin or sodium salicylate in five to ten grains with double the quantity of sodium bicarbonate per dose. Phenacetin and verammon in one to two grains each, may be

5 Hurst (1935) Lancet ii p 697-758

6 Hurst (1936) Brain ix 1

7 Peet, Fehols and Richter (1937) Jour Amer Med Assoc 108 p 2181

exhibited with some relief when the pain is very intractable. All these remedies may be given every four to six hours. *Lumbar puncture* may be tried in all cases showing marked pains, and when under pressure the withdrawal of the cerebrospinal fluid may relieve symptoms. In bad cases eukodal or morphine and atropine may have to be tried. In the presence of paralysis of the respiratory muscles atropine or bella donna in suitable doses combined with strychnine may be of service.

Urotropine orally in five to ten grains to younger children, repeated every four to six hours, or every twelve hours, five c cm of a forty percent solution intravenously, may help in either aborting or favourably influencing the disease. *Sera* of the specific type is of use when given before the involvement of the nerve fibers. But this is as a rule not possible unless in an epidemic, hence the once expected results are not achieved in practice.⁸

When the paralysis is extensive with the involvement of the muscles of the thorax, head neck etc., a great care should be exercised in feeding the patient, and this is best done through a nasal tube. The patient needs be kept at rest for about five to six weeks.

Stage of paralysis

Muscular relaxation in the position of physiological rest, at least for three weeks avoiding all movements, is an important item in the treatment. Light celluloid splints which may be easily removed for massage and passive movement, prevent contractures and stretching of the limbs. The opinion of a surgeon may be of value at this stage as to the position of maximum comfort and so on.

Warmth Not only the patient should be kept warm day and night by proper garments but also warm baths, local application of heat, hot douches may be of service.

Movement and Massage This may be commenced with advantage as soon as the fever leaves and pain on movement is gone. In about a fortnight to five weeks time gentle massage and passive movement may be started.

This movement, first passive, then against resistance, is the normal physiological stimulus for the proper growth and nutrition of the atrophied muscles, hence should be done regularly as soon as the pain and fever are gone. Local warmth, counter-irritant liniments may be of much use.

Electricity suitably applied may prove of some use.

Tonics Containing iron, arsenic, myrrh, camphor and vitamins are of service. Strychnine in Easton's syrup or liq. strychnine hydrochlor in

⁸ Hurst, (1939) Jour Amer Med Assoc 109 p 1000

two to four months not only improve digestion and appetite but also help easy conduction of the nerve impulses and thus in restoring function

Late Contractures are treated mostly by surgical procedures such as (1) division and transplantation of tendons, (2) resection of joints, (3) mechanical supports and (4) amputation in very badly altered cases

Preventive inoculation An appreciable immunity develops when a formalised vaccine is injected in children but how far this may be applicable in practice is doubtful

CHAPTER XXIV

EPIDEMIC ENCEPHALITIS

(Lethargic Encephalitis)

Diagnosis. The majority of cases occur during colder months and at the first half of adult life though cases are recorded in persons of seventh decade It is not uncommon in India

This moderately febrile illness more commonly diagnosed initially as influenza¹ is only definitely established after a few days to two weeks time But sooner or later the characteristic syndrome of lethargy pronounced during the day, not uncommonly inversion of sleep, with active nights showing feverish activity alternating with inactive days a dull mask like face, rigidity, nuclear ophthalmoplegia, obstinate constipation sometimes sialorrhoea, etc help in the diagnosis notably at the earlier stage of the disease Later on, tremors peculiar Parkinsonian syndrome with rigidity, loss of associated movements more marked or present only on unilateral half of the body are highly suggestive of epidemic encephalitis Early bilateral ptosis is an important diagnostic point Incontinence of the sphincters is the rule, and may be due to lethargy

There may be involvement of the pyramidal tract leading to loss of abdominal reflexes² increased tendon jerks and extensor planter response These cases may simulate multiple sclerosis Neuralgia and neuritic phenomena may complicate the clinical picture Focal spinal lesions are not uncommon

Cerebrospinal fluid shows lymphocytosis in majority of cases

Recently Negishi and Omori (1936)³ described an epidemic in Japan with milder manifestations such as fatigue, anorexia, chilliness, headache, gastric pain, diarrhoea, impairment of vision, pain in the eyes, violent heat in the soles of the feet and so on

The post-encephalitic psychic changes and alteration of the mind demand special and sympathetic consideration⁴

This condition may have to be distinguished from hemiplegia due to various causes The degenerative form of paralysis agitans has got to be differentiated from this post-encephalitic Parkinsonian syndrome

Death rate during the acute stage according to Hall⁵ (1935) is about 25 to 30 percent being more fatal in the elderly than in the young Pregnancy makes the outlook of an acute attack unfavourable

TREATMENT

Medicinal

As little is known about the etiology of this condition, specific treatment is not possible at this stage of our knowledge Six daily

1 Romberg and Bremer (1929) Munch Med Woch p 570

2 Pakozdy (1928) Deut Zeitsf Nerven heilk, 103 p 309

3 Bull de l'off internal d'Hyg publ (1936) 27, 28 p 847

4 Tannenbaum (1936) These de Paris, No 177

5 Lancet, (1935) n July 20th p 147

intravenous injections of a ten percent solution of sodium salicylate in sterile normal saline increasing initially from two and a half to seven and a half c.c.m. may be tried. Fixation abscesses produced by the subcutaneous injection of a few millims of some such irritant like, T C C O (turpentine, camphor creosote in olive oil) has been extensively tried with variable result. These abscesses are opened up when they point towards the surface of the skin. Hexamine in ten to fifteen grains orally every four to six hourly may be of use. It may be given per rectum every twelve hours care being taken to avoid irritation of the urinary tract. Injection of electragol has got its advocates.

General measures, nursing etc. As in all acute infectious diseases here too good and capable nursing, an open well ventilated room, avoidance of the obstinate constipation may be of service. Retention of urine in the bladder during the acute stage of the disease due to profound lethargy may require careful catheterisation at regular intervals with careful aseptic precautions. Quinine in four to five grains twice a day or in three grains thrice daily may help in reducing the fever. Cryogenin and mistochin in two grains each, every six to eight hourly may help in reducing the temperature.

Rigidity of the neck and a positive Kernig's sign coupled with lethargy and drowsiness indicate a lumbar puncture. I or sleeplessness veronal, medial, oral etc., in two to four grains may be tried. Restlessness demands chloral hydrate and bromides in ten to fifteen grains of each, every six to eight hourly. Atropine in $1/100$ gr., with equal or half the amount of hyoscine may be useful in not only combating the restlessness but also may relieve the tremor rigidity etc. But in some cases hyoscine may produce excitement instead of rest.

For pains and aches omnopon in one third to one fourth grain doses may be tried when coal tar groups of analgesics fail to give reasonable relief. Kraus (1929)⁶ reported favourable results in three cases, by subcutaneous injections of the patient's own blood in gradually increasing amounts, where other measures failed to do any good.

Post-encephalitic Parkinsonism syndrome, is treated mainly by atropine, hyoscine and stramonium group of drugs. They may be given orally or by injections. They act best on the rigidity, but upon the tremor, they appear to show very little effect. Hyoscine and atropine are given by injection in doses already indicated. Given orally hyoscine in $1/100$ to $1/50$ gr and the tincture in ten to twenty drop doses, three times a day, may prove effective.

Extract stramonium (U S P) in 0.05 gram orally increased up to 0.25 gram thrice daily, where well tolerated, the bigger doses are given with some effect. This preparation of the U S pharmacopoeia may be of service in some cases.

Genoscopolamine⁷ in four mgm doses in the maximum or some such preparation may be used with advantage.

There is often dryness of the mouth, blurring of vision due to paresis of accommodation which are treated by adding about 1/16 gr of pilocarpine nitrate per dose of the above remedies. These medicinal measures may be continued for a long time, in quantities just short of unpleasant reactions, but generally with enough salutary effect to ameliorate most of the troubles of the patient.

made up best, either by mustard or simple hot water. The mustard bath is prepared by dissolving one tablespoonful of good mustard in a gallon of water having a temperature of near about 100°F. But for ordinary purposes the bath is prepared by putting one tablespoonful of mustard in half a medium bucketful of warm water. The temperature can be best judged by the feeling of the patient in the feet, initially it should be just comfortably warm, then gradually hot water may be added. To immerse the feet in the bath from seven to ten minutes usually is sufficient. Then having the feet been wiped dry the patient should go to bed and put on warm clothing in the winter, and suitable dress in the summer. Hot water bottles at the cold feet and if the patient feels chilly, warm drinks may be of some relief.

There is a special tendency to undue perspiration in these cases, specially in the summer months and during the rains. This tends to make the clothing get drenched, and if fans play on the patient, there is a risk of aggravation of symptoms. Under such cases a reasonable temperature of the room and repeated change of the wet clothes, the patient being made dry and powdered properly, are useful to prevent catching of cold. He should be in bed so long as the symptoms persist. Sometimes the patient is unwilling to take rest. But if it is explained to him that at the early stages the efficacy of one day's rest is equivalent to that of three or more days later on and that he is also likely to escape complications, when so explained unless very hard pressed, the patient will comply to take rest.

Itches and Pains If there is much pain a prescription like the following for an adult is useful:

Veramone	gr	3
Quinine salicylate	gr	3
Phenacetin	gr	2
Soda Bicarb	gr	3
Sugar of Milk	ad gr	15

one every six hourly, not more than three doses a day. In cases with constipation, or when seen for the first time one can add to each powder 1½ gr of hydrarg sublchlor and three such are taken, the total of 1½ grains effectively evacuates the bowels and the other medicines may so relieve the patient that he is likely to be satisfied with the improvement.

Personally one does not, as a rule, believe in using in these powders caffeine citrate though very useful, in relieving the headache, as by its stimulant action on the higher psychical centres it may cause sleeplessness and agitation in the patient. In powders, for relief of pains and aches, to be used at day time and where sleep is not affected, small doses of caffeine citrate is a useful remedy.

Dover's powder is useful in five gr doses and helps in drying up

the secretion specially when there is much running from the nose. But constipating after effect need treatment by either alone $\frac{3}{4}$ to $\frac{1}{4}$ gr or with such suitable purgative. But as a matter of experience one has seen, that after Dover's powder the patient, sometimes, complains of pains or tightness over the chest, and the infection may creep down to the tubes.

When the secretions are very free and running from the nose a prominent feature, oil eucalyptus minus two or Dover's powder gr two to three may be added to each of the above powders. They generally cause drying up of the secretion of the upper respiratory passages and prove gratifying. Washing the naso-pharynx with warm normal saline or half or one percent sodium bicarb solution, which is sniffed up through the nose may prove useful.

Abortive and Curative treatment of Common cold¹

It consists simply in discharging half a dropperful of a four percent solution of mercurochrome with a quick squeeze of the bulb, into each nostril so that the solution floods the fore part of the inferior turbinates and runs to the throat. The patient breathes through the mouth and remains supine until the fluid runs posteriorly into the throat when he assumes the upright position. The patient should be asked not to blow the nose for fifteen minutes. If the patients are supplied with a dropper and a bottle of medicine they could treat themselves every three hourly until the cold was gone. But to be effective it must be started very early. In practice I have seldom found it so useful, probably because the patient comes late.

Local Application Sprays etc

When there is soreness of the nose and throat steam inhalation with tincture benzoin compound in it is often soothing. The ordinary steam inhalers bought from the druggists are quite suitable for the purpose.

There are various inhalant remedies in the market and some of them are useful. The main active constituent of most of these is chloroform. There are other oily local applications which contain mainly chloroform and menthol etc dissolved in oil for application through a suitable nebulizer or glass dropper. Mistol, anaquintin, endrine are some of the examples of these oily preparations. They are of use in suitable cases.

Adrenalin and ephedrine, due to their constricting effect on congested nasal mucosa with dilated capillaries, have been extensively used. Adrenalin is very prompt in action, ephedrine though slow, sustains the action by causing constriction of the blood vessels thus relieving the congestion.

¹ Bassler, (1935) Laryngoscope St Louis 45 p 877

Any mildly alkaline antiseptic solution like Dobell's solution or containing —

Sodium Bicarbonate	gr	3
Sodium Chloride	gr	3
Acid Carbolic	gr	1
Glycerine	ml	45
Aqua distil	ad fl oz	one

A small hollow rubber ball of two oz capacity with a blunt nozzle is a convenient instrument for washing the nasal passages, the patient holding the head inclined forwards on a basin and breathing deeply all the while the washing goes on.

But instead of actively douching the nose, as indicated above it appears more convenient to wash the nose by sniffing up the solution, thus avoiding the risk of infecting the other parts by producing local injury or tear or laceration. Blowing of the nose tends to force the infection through the eustachian tubes, hence it should be warned against.

Silver salt solutions The organic silver salts like protargol or argyrol in four to ten percent solution according to the severity of the case, the strength of the solution being lower, acuter the condition, painted once a day at the back of the throat and as a nasal wash may be of some service. Silver nitrate one to four percent solution, used for painting the parts, only once a day, may be useful.

Sprays One percent each of menthol, camphor, eucaliptus in benzoinol or liquid petrolatum to be used through an atomizer is soothing and act like mistol and other similar preparations.

A prescription like the following may be used also—

Menthol	gr	10 to 15
Camphora	gr	20
Eucaliptolis	ml	20
Oil Rose	ml	3
Benzoinol	ad fl oz	two

To be used through an atomizer when required. But for this purpose special oil atomizers are required.

A D Vibiss spray is also suitable for this purpose of spraying watery or oily liquids.

Inhalation Besides inhalation of simple tincture benzoin vapour, one can inhale through a steam inhaler a preparation like the following:

Oil Pine	ml	30
Oil Eucaliptus	ml	30
Menthol	gr	10
Creosote	ml	10
Tr Benzoin Compound	ad fl oz	two

twenty drops in boiling water for inhalation. For house hold purposes one may use pitchers, kettles, or any narrow mouthed vessel, and a stiff paper rolled as a funnel or a croup kettle or the inhalers available in the market in druggists shops.

Later When the discharge becomes thick, warm alkaline naso pharyngeal washes or sprays of the following type may be used

Soda Bicarb

Soda Baborate $\frac{1}{4}$ gr 30

Aqua Distil ad fl oz four

This solution may be sniffed up the nose, and the throat also may be washed with it as a gargle. When there is much obstruction due to congestion any suitable adrenalini application, may relieve the patient by reducing local congestion.

Beyond simply sniffing up these solutions and gargles, nasal irrigations and douches are better avoided as they are likely to induce otitis. The same risk is there if the nose is blown very forcibly.

* *Sore throat* is to be treated in the lines indicated above. The patient should avoid smoking, or reduce it to a minimum, specially in chronic or subacute state. When there is a cough without any physical findings in the chest, a prescription like the following may be used —

Syrup Codeine Phosphatid m 30

Ammon Chloride gr 5

Thiocol gr 3

Syrup tolu m 60

Aqua Chloroformi ad fl oz half

one dose thrice daily

The commonest complications are the affections of the respiratory tree, either through spread by contiguity or by other means.

Antral involvement, sinusitis, otitis media are also not uncommonly seen specially in the younger subjects.

Local Treatment At first washing with a warm weak alkaline saline, like the one of Dobell's solution, to be followed by an oily application like the one in the prescription already given is of service. When the nasal discharge is offensive, a weak antiseptic like potassium permanganate solution one in thousand, may be usefully employed as a local wash to be followed by a solution of some silver salt such as protargol or argyrol or silver nitrate. If silver nitrate is used the strength of the solution should be about three to eight percent. When the organic silver salts are used the strength should be of about five to fifteen percent. The strong silver paints should preferably be given only once a day and by the doctor himself, care being taken, to apply them uniformly all over the affected parts.

Prophylaxis good hygienic measures, open air life, sleeping in rooms with doors and windows open, good food with adequate vitamins, avoidance of excess chill, and keeping of the body resistance high puts off illnesses of these types. Special care should always be exercised to avoid exposure to droplets through sneezes, coughs, talks etc. Infected handkerchiefs, linen, towels, dishes, cups etc may spread the disease, and hence one should be careful.

CHRONICITY

Teeth, tonsils, adenoids when infected tend to cause chronicity of these conditions and they should always be properly dealt with. Chronic gastro-intestinal disturbances, unsuitable dusty occupation, sudden variations in temperature, abuse of tobacco, over use of the voice may help to keep an infection lighted up and render it chronic.

Symptoms are chronic rhinitis or rhinopharyngitis irrigation of the nose and throat, with or without discharge. Voice is generally improper, there may be incrustations in the nostrils. Aching or discharge of pus from the ears may be met. Digestive disturbances are not uncommon. The mucous membranes may appear dry, glazed, or congested. Sometimes there is considerable swelling so that it is difficult to inspect the upper portions of the post nasal space.

Treatment The most important item in the treatment is that of general hygiene.

Clothing The clothing should be such that the temperature of the patient is kept as even as possible. He should be careful against chills or colds also against heat and drenching perspirations.

Baths When made used to cool or cold baths, starting initially from tepid ones may help not only by promoting the circulatory activity but also by reducing the patient's susceptibility to cold. Regular cool sponging of the body once a day may help too in the same way.

Ventilation The ventilation of the bed room should be adequate, specially at night.

Exercise If the patient is used to a sedentary life, he should be insisted to take regular physical exercise in the open air whenever possible.

Diet Diet should not only contain all the proximate principles, but contain also adequate amounts of all the vitamins. Regular use of some good brand of codliver oil twice or thrice daily with or without milk may be of use. When the daily diet includes a cup of milk, an egg, some fruits, and a little butter, the recovery has been found to be easy and quick. Constipation should always be avoided.

sago and milk, decoction of lentils, fruit juice, smashed potatoes with milk sweetened, sago or flour or rice boiled with milk sweetened or simply as it is, with salt, are suitable Indian preparations. For those who take a mixed diet, custard, jellies, ice-cream, puddings, pish pash, soft boiled egg or egg flip etc may be freely given. Hot food and drinks are more soothing than cold things.

Sometimes in tonsillitis there is much loss of weight and hence the caloric need of the patient should be very carefully satisfied, and as much food as the patient can take, granted.

Drink Soups, tea, coffee, plenty of water, or any suitable drink like hot lemonade etc are liked by the patient. Juice of sweet fruits is also not painful to take, and should be given liberally to furnish adequate amounts of "C" vitamin.

Bouels, aches and pains etc It is better to give either simply hydrarg subchlor in divided, say $\frac{1}{4}$ to $\frac{1}{2}$ gr with double the amount of sodiu bicarb every hourly, in the evening, till three to six doses are taken. But a powder like the following may be useful when there are headache, pains and aches in the body.

Phenacetin	gr	1
Hydrarg Subchlor	gr	1'
Veramon	gr	2
Pot chlorate	gr	1
Sodiu Salicylas	gr	3
Sodiu Bicarb	td gr	15

one every four hourly

The potassium chlorate is useful because after absorption it exerts an antiseptic action on the affected glands etc. Sodium salicylate appears of use in all forms of tonsillitis.

A prescription like the following may be given

Tr aconite	m	1
Sodn Salicylas	gr	8
Sodn Bicarb	gr	20
Pot chlorate	gr	1
Syrup Aurenti	m	60
Aqua Cinnamoni	ad fl oz	one

One dose every four hours

Coal tar preparations like phenacetin antipyrin and also the more recent analgesics like veramon in about five gr doses may be given. Their analgesic effect lasts usually for about four hours. Compral stridon useful for aches and pains are usually given in three to five gr repeated doses. They along with the recent barbituric acid group of drugs may be useful in sleeplessness with aches and pains etc. Where sleeplessness is present due to pains etc., one may try a prescription like the following

Luminal	gr	1/4
Veramon	gr	2
Phenacetin	gr	1
Sodn Bicarb	gr	3
Sugar of milk	ad gr	10

one every four hourly in the evening after some suitable food

Divided Doses

Personally one has found that small divided doses of these medicines are more useful when repeated at frequent intervals than bigger ones given all at a time.

Injections of Bismuth

Recently Berberich (1937)² following the good results obtained by Monteiro a few years back, tried injections of bismuth in tonsillitis with encouraging results.

A harmless preparation like metallic bismuth used in syphilis when given intra muscularly reduced duration of the disease to half. Usually within twenty four hours after an injection into the gluteus muscle, the temperature is said to come down to normal coating on the tonsils cast off and oedema disappears. Generally difficulty in swallowing improves in eight hours and a favourable general condition is said to be established in about twenty four hours.

Sponges etc When the fever is very high and the young patient complains of burning of the skin or is restless a tepid sponging proves very gratifying and may even induce sleep.

Mouth, teeth etc. The teeth should receive every attention. The nose should be cleansed by boroglycerine or by some suitable oily application. Not only the teeth should be brushed daily with good paste and brush but the mouth should be rinsed with some suitable antiseptic solution like, pot chlorate a dram to four ounces of water, or boric lotion or one fourth part of hydrogen peroxide and one part of water. This hydrogen peroxide gargle is useful in cleansing the mouth well, as it takes away in the foam all pus etc. If the teeth are bad painting the gum margins with two to four percent mercurio-chloroform solution is of use.

For the average case and for poor patients a hot solution of alum with a little oil gaultheria and peppermint dissolved in a small proportion of rectified spirit may form a good mouth wash and gargle for the inflamed tonsils. The following is a useful gargle:

Formalin	}	m	120
Absolute Alcohol		m	60
Chloroform		m	10
Oil gaultheria		m	10

thirty drops in half a glass of water, to be used as a gargle.

Sponges

After tepid sponging the hair of the patient must be carefully dried up by a dry towel or by some suitable dry cloth etc. Powdering of the body after sponging is soothing and tends to keep the skin clean and dry, preventing cutaneous troubles.

Local Treatment.

Abortive. It has been suggested³ that a twenty to twenty five percent solution of silver-nitrate when applied once a day liberally, to the tonsils and the back of the throat, at the very beginning of the trouble, may abort the infection (tonsillitis). But it must be carefully applied by the doctor himself, warning the patient against swallowing any portion of the paint.

Pigmentum Iodi cum Potass iodide. (Mandl's Solution)

Iodine	gr.	6
Pot Iodide	gr	15
Phenol	gr.	15
Oil Menthipip	m	5
Glycerine	ad. fl oz	one

to paint the throat thrice daily.

Gargles and sprays

As regards gargles sprays etc. Mandl's solution and other local

³ Meara, (1921) Treatment of acute infectious Disease Tonsillitis p. 84
eas, nd Edition Mac-Millan Co., N. York.

applications prescribed for sore throat may be used with advantage Gargling becomes very difficult at the later painful stages Children, can not as a rule gargle at all, hence the usefulness of sprays or local paints Inhalation of vapour of tr benzoin co may be soothing The following having resorcin and phenol as its active constituents may be used with advantage

Resorcin	gr	40
Phenol	gr	10
Spt Menthipip	in	15
Glycerine	ad fl oz	one

to paint the throat as directed

Pain in swallowing In painful swallowing the following method (Hovell) may be of some relief The attendant should stand at the back of the patient, pressing tightly with his upwards pointing fingers and palm, the sides of the patient's head over and below the ears As soon as the patient tries to swallow, the pressure is increased as much as possible and the auricle pushed upwards This pressure often enables him to swallow with comparative ease, who would, due to excessive pain, otherwise refuse to take any food

Hot compresses Hot compress or fomentation over the surface of painful and sore areas in the throat is often gratifying

Locally Cataplasma Kaolini as a hot moist counter irritant application may be of some comfort

Adenitis Sometimes there are variable degrees of involvement of the lymphatic glands specially of the cervical regions Those at the angle of the lower jaw may also be affected

For this purpose cold application in the form of ice or ice bag the former covered by a flannel or towel may be of use Direct and too long contact of ice may be damaging to the skin

Ichthyol applied several times a day in the following form on the inflamed glands may be of relief

Menthol	gr	4
Ext Belladonna sicum	gr	10
Ichthyol	gr	120
Collodian	ad fl oz	one

To paint over the glands four to six times a day

The application has the advantage that it is not messy and as it sticks to the skin closely when dried, it does not stain the clothes It is a useful local application and is as effective, if not more so, as

Mouth teeth etc. The teeth should receive every attention. The nose should be cleansed by boroglycerine or by some suitable oil application. Not only the teeth should be brushed daily with good paste and brush but the mouth should be rinsed with some suitable antiseptic solution like pot chlorate 1 dram to four ounces of water or boric lotion or one fourth part of hydrogen peroxide and one part of water. This hydrogen peroxide gargle is useful in cleansing the mouth well as it takes away in the foam all pus etc. If the teeth are bad painting the gum margins with two to four percent mercurochrome solution is of use.

For the average case and for poor patients a hot solution of alum with a little oil gaultheria and peppermint dissolved in a small proportion of rectified spirit may form a good mouth wash and gargle for the inflamed tonsils. The following is a useful gargle:

Formalin	}	1 m 120
Absolute Alcohol		m 60
Chloroform		m 10
Oil gaultheria		m 10

thirty drops in half a glass of water to be used as a gargle.

Sponges

After tepid sponging the hair of the patient must be carefully dried up by a dry towel or by some suitable dry cloth etc. Powdering of the body after sponging is soothing and tends to keep the skin clean and dry preventing cutaneous troubles.

Local Treatment

Abortive. It has been suggested³ that a twenty to twenty five percent solution of silver nitrate when applied once a day liberally to the tonsils and the back of the throat at the very beginning of the trouble may abort the infection (tonsillitis). But it must be carefully applied by the doctor himself warning the patient against swallowing any portion of the paint.

applications prescribed for sore throat may be used with advantage. Gargling becomes very difficult at the later painful stages. Children, can not as a rule gargle at all, hence the usefulness of sprays or local paints. Inhalation of vapour of tr. benzoin co. may be soothing. The following living resorcin and phenol as its active constituents may be used with advantage.

Resorcin	gr	40
Phenol	gr	10
Spt Menthipp	in	15
Glycerine	ad fl oz	one

to paint the throat as directed.

Pain in swallowing. In painful swallowing the following method (Hoyle) may be of some relief. The attendant should stand at the back of the patient pressing tightly with his upwards pointing fingers and palm, the sides of the patient's head over and below the ears. As soon as the patient tries to swallow the pressure is increased as much as possible and the airhole pushed upwards. This pressure often enables him to swallow with comparative ease who would due to excessive pain, otherwise refuse to take any food.

Hot compresses. Hot compress or fomentation over the surface of painful and sore areas in the throat is often gratifying.

Locally. Cataplasma: Kaolini is a hot moist counter irritant application may be of some comfort.

Idenitis. Sometimes there are variable degrees of involvement of the lymphatic glands specially of the cervical regions. Those at the angle of the lower jaw may also be affected.

For this purpose cold application in the form of ice or ice bag, the former covered by a flannel or towel may be of use. Direct and too long contact of ice may be damaging to the skin.

Liquid arsenic	or	..	-	... on the
Liq arsenici hydrochlor	m	3		
Ferrous Sulphate	gr	2		
Adexolin	m	15		
Pulv Acetia	q	"		
Syrup Rose	m	60		
Aqua	ad fl oz.	1		

one dose, twice daily after some food, for five days in the week, for three weeks.

⁴ Wallace (1924) Brit Med Jour p 296.

⁵ Wherry (1929) Ibid p 766

Codliver oil or any such suitable fattening vitaminous tonic, with adequate square diet, goes a good deal to ward off future attacks

CHRONIC TONSILLITIS

Diagnosis There may be chronically enlarged tonsils without giving rise to much discomfort. Generally due to associated adenoid being enlarged the patient's facies is typical and these children are habitual mouth breathers with a proneness to catch cold easily. Catarrh of the nasopharynx and the respiratory passages may be a matter of constant trouble to them. They usually have an improperly developed flat chest with mouth breathing dry irritative cough restlessness at night and disturbed sleep. Repeated acute inflammations of tonsils may help to give rise to such serious systemic diseases as rheumatic fever, chorea, endocarditis, nephritis, cervical adenitis, otitis media etc. These children are often backward in the class and are not uncommonly dull. They may suffer from deficiencies of the endocrine glands also.

TREATMENT

Septic tonsils with infection buried deep in their crypts, are usually not materially affected by any local application, of which probably Mandl's pigment is one of the best.

Silver nitrate solution ten to twenty percent may be applied. This should not be given more frequently than once a day or on alternate days.

Auto vaccine Auto vaccine made from strepto-haemolyticus isolated from the patient's throat, beginning from fifty to hundred million organism increasing each time by the same amount, or more, given every fourth to fifth day, may do some good.

Improve general health Improvement of the general health of the patient, by all means at our command, should also be insisted upon, and good food with all vitamins, butter, eggs, milk, tonics, open air life and breathing exercises may be of service.

Operation But most of the chronically infected tonsils are prolific sources of toxic absorption leading to various systemic manifestations.

Dohilman (1934)¹ reviewing the indications for tonsillectomy has suggested that tonsils whose repeated infections are reasonably associated with systemic manifestations or cause other associated troubles directly or indirectly attributable to tonsillar² infection should be removed. Indiscriminate removal of all tonsils when only hypertrophied is not justified. Some are of opinion that as all lymphoid tissues of the body tend to undergo retrogression at the age of thirteen

¹ Acta otolaryngol, (1934) 20 p 934

² Medical Annual, (1936) p 472

or there about, after puberty, their removal should be deferred till the patient reaches beyond that age.

But in short the following are some of the commoner indications for tonsillectomy.

- (1) When they are the seat of chronic infection
- (2) Repeated attacks of acute tonsillitis proving refractory to all medical treatment.
- (3) Repeated infection of the upper air passages
- (4) When such complications like rheumatic³ fever, endocarditis or nephritis, are apprehended or mild attacks of the aforesaid diseases have manifested themselves
- (5) When there is cervical adenitis traceable to probable tonsillar infection

³ Kauer, (1926), Jour. of Lab and Clinical Med. St. Louis 21 March 125, p. 69.

chest either with some counter irritant liniment or ointment A liniment like the following one is useful

Liq Ammon fort	{		
Oil Eucaliptus		m	60
Oil Gaultheria			
Iodine Crystals		gr	10
Camphora		gr	60
Soda Birch		gr	20
Tr Capsicum		m	15
Oil Sinapis	ad fl	oz	2

To be rubbed on the chest briskly every six to eight hourly after and before fomenting the parts For this, pads of cotton warmed up on dietz lantern or hot wet compress may be suitable

Expectorants Diuretics and Diaphoretics

At the very beginning alkaline saline diuretics and diaphoretics with some expectorants, given every four to six hourly may be of service

Pot Citrate	gr	20
Liq Ammon Acetatis	m	60
Tinct Ipecac	m	10
Ammon Chloride	gr	10
Syrup Tolu	m	30
Aqua Chloroformi	ad fl	oz

The above mixture has the advantage of helping elimination by diuresis diaphoresis and also a good expectorant

^{soo} *Hypnotics* May have to be continued specially at the beginning by either five to ten grains of Dover's powder at night for an adult or codeine phosphate in half to one grain or morphine three to five grain or luminal half to two grain doses and others according to the patient's habits age, body weight etc When he is habituated in taking hypnotics these may have to be given in bigger doses In some cases heroin 1/12 gr may prove useful specially this drug and codeine are of use in cases where the fruitless hacking cough keeps the patient awake at night The above drugs are best

thrice daily is useful. When the secretions are copious a suitable saline mixture like the following is good enough

Sodn Chloride	gr	10
Sodn Bicarb	gr	10
Vinum Ipecac	m	10
Syrup Tolu	m	60
Aqua Camphori	ad fl oz	1

one dose thrice daily

But when there is cough too along with expectoration, to the above mixture one may add tinct opii camphorata in ten to twenty minum doses (B P 1937)

Debility In debilitated elderly persons or in exhausted young infants, ammon chloride or ammon carb., the former probably a more effective expectorant, in three to ten grs is often useful and acts also as a mild stimulant. Infusum senegi may be added, instead of aqua and this causes much free expectoration.

Alcohol Unless there is much debility and the patient is used to drinks there is not much indication for it. When required it should be given in one to four dram doses every three to six hours.

Cough late at night This often is a very troublesome persisting symptom in some cases due to residual trachitis and may be relieved either by suitable treatment of this condition or by one dram doses of elixir diamorphina et terpin cum apomorphine of B P C. Sometimes a prescription like the following will do some good

Oil Cinnamomi	m	3
Oil Eucalyptus	m	3
Pulv Gum Acacia	q	5
Syrup Codeine Phosphate	m	30
Syrup Tolu	m	60
Aqua menth 1 ip	ad fl oz	1

one dose every six hourly

This often relieves cough in most cases. When the cough is still persistent even after proper treatment one should get the sinuses teeth and other sources of sepsis, properly examined and dealt with. A skigram of the chest will be helpful. In the absence of any sepsis, a tonic mixture like the following may do some good

Calcium Chloride	gr	10
Liq Strychnine Hydrochlor	m	3
Acid hydrochloric dil	m	10
Liq Ferri Perchlor	m	15
Syrup Aureanti	m	60
Aqua Chlorformi	ad fl oz	1

one dose thrice daily

When the medium sized tubes of the bronchial tree are affected the

signs and symptoms are more protracted. The fever and the systemic disturbances are greater and the local signs and symptoms more severe, than those in tracheo bronchitis of bigger tubes.

The same general rules of management, diet and treatment should be employed as in the treatment of ordinary bronchitis, but the depressant expectorants like vinum antimonii etc., should not be given specially at the later asthmatic stages. Stimulant expectorants like the following may be useful.

Ammon Chloride	gr	5
Tr Scilla	m	10
Soda Bicarb	gr	15
Syrup Tolu	m	60
Aqua Chloroform	ad fl oz	1

one dose thrice daily

If the secretions are very dry and there is asthmatic tendency, a mixture like the following may do good.

Ext Grindelia Liquid	m	10
Ammon Chloride	gr	7
Pot Iodide	gr	4
Tr Stramonium	m	10
Lig Arsenici Hydrochlor	m	3
Syrup Rose	m	60
Aqua camphora	ad fl oz	1

one dose after food thrice daily

For circulatory and asomotor failure the corresponding paragraphs under the treatment of pneumonia should be consulted.

Oxygen When given briskly and in proper amount and method, it is of use, especially if cyanosis is present. For details the treatment of pneumonia should be consulted.

BRONCHITIS OF THE FINER TUBES

Acute suffocative catarrh

Here again the signs and symptoms are of a very grave type and often the manifestations are like those of broncho pneumonia. Cough with expectoration, cyanosis, dyspnoea, hurried breathing, marked asthma may supervene quickly. These patients commonly children require stimulant line of treatment from the very onset, and also oxygen, tincture benzoin compound inhalation, should be started from the very beginning. Circulatory failure which often appears sometimes from the start requires treatment in the lines suggested in pneumonia.

Careful observation and record of the pulse rate, respiration, onset of cyanosis, dyspnoea, cough, etc., should be made.

As already emphasised, stimulant line of treatment is indicated from the very beginning in these cases.

CHAPTER XXVIII

PLEURISY

(Dry & with Effusion)

Dry Pleurisy

Diagnosis Friction rub which remains constant after coughing rather superficial to and fro¹ with stitch at the side aggravated by respiration cough and so on are suggestive There may be pain on the sides but without pleuritic rub The diagnosis of diaphragmatic pleurisy is often troublesome and always difficult Primary dry pleurisy is usually tuberculous in origin Previous good health satisfactory general condition and mild symptoms are not generally to be regarded as sufficient evidence against this diagnosis Primary dry pleurisy as indicative of tuberculosis is equal in significance to primary pleurisy with serofibrinous effusion or haemoptysis only of a clear sky¹ Pre-eruptive stage of herpes zoster rarely may give rise to marked pain which may be difficult to diagnose unless the eruptions come out Stethogram of the chest pulse respiration temperature weight records may be helpful in diagnosis Differentiation has to be made from intercostal neuralgia, pleurodynia² and other local causes of pain

TREATMENT

Pain The most important item in the treatment at the acute stage is the relief of the pain

Fixation etc Next to rest in bed, the first thing usually done, is to completely limit the movement of the affected side of the chest in position of expiration by strapping from the spine to the sternum with adhesive plaster of a suitable type Before applying it, the hairs if present, should be shaved off and spirit and powder applied The strapping should not be allowed to remain for more than seven days at a time Care must be taken not to abrade the skin while they are removed

Warmth locally One of the simple methods to relieve pain is by local application of warmth or by counter irritation or better by both One may choose any one or several of the following, cataplasma kaolini (Antiphlogistine group), hot water bottles, linseed poultice, hot salt or sand bags, fomentation dry or moist, though the first method is preferred Mustard plaster, brisk rub of either wintogeno or Vicks' vapo-rub etc, preceded and followed by fomentation, are of relief

1 Osler's Modern Medicine Vol 4, Lord (1927) Diseases of the pleura p 296 Lea Febiger's Philad

2 Harder (1936) Amer Med Sci May p 678

As the pain may keep the patient awake or prevent his rest one may give a powder like the following at bed time to promote sleep

Luminal	gr	1
Aspirin	gr	3
Phenacetin	gr	2
Soda Bicarb	ad gr	10
one powder, every six hours		

When the patient is *constipated* one may add phenolphthalein or hydrarg subchloride half a grain in each of the above powders, till three are taken. If *insomnia* is present half a grain of luminal to each powder thus making a total of one and a half grain in all, for an adult, may be of service

Dover's powder in five to ten grain doses is a useful remedy. But its constipating effect should be counteracted by adding some suitable laxative like aloin half a grain or phenolphthalein or hydrarg subchloride in grain one to two. But in all cases where hydrarg subchloride is prescribed the condition of the teeth needs be gone into carefully. Because in bad or aching teeth it is poorly tolerated and often makes the pain worse.

In very protracted cases about three to six leeches applied locally are of some use. But this is not liked by all patients. For the method and details the paragraph on heart failure dealing with the application of leeches should be seen.

If the pain keeps the patients awake inspite of the above lines of treatment morphine and atropine hypodermically in $\frac{1}{5}$, and $\frac{1}{150}$ of a gr respectively or in smaller doses may have to be tried. Herom $\frac{1}{10}$ gr or omnopon $\frac{1}{6}$ to $\frac{1}{4}$ gr or eukodal one tablet orally or an ampoule given hypodermically relieve the pain of the patient. Another method of relieving pain is to infiltrate the parietal pleura over the most painful area with about ten to twenty c cm of a one per cent solution of novocain. The same technic is followed as in cases of anaesthetising the pleura either during an artificial pneumothorax or exploratory puncture or paracentesis thoracis.

The more important item in the general treatment consists in giving the patient *absolute rest even* if he is afebrile and the general signs and symptoms do not warrant it. This complete rest period should extend at least upto two weeks in afebrile cases but in cases with fever the patient should not be allowed to leave the bed at least for two to four weeks after complete subsidence of pyrexia. The sputum when present should be examined regularly for acid fast bacilli. A skin gram of the chest may divulge lesions which were missed by the clinical examination. Regular pulse, temperature and weight charts are of distinct use to keep an watch on the case.

Preliminary evacuation of the bowels should be ensured as in all other acute febrile states

Diet At the beginning when there is not much inclination for food, only fruit juice, milk or its preparations, glucose etc., need be given. Later on maintenance of nourishment of the patient is of importance. For this the dieto hygienic regime discussed under pulmonary tuberculosis should be advocated.

Convalescence The patient should be very careful about his health for at least two years, because the risks of development of frank tuberculosis is great during that period.³

The only guides to assess the progress of such cases are serial radiograms taken every few months, regular charts of oral temperature noted every four hourly, pulse and weight records and so on. The sputum should always be examined carefully, every few days, if not daily. We often see cases in practice who show recurrent pleuritis with fever but without any evidence of lung involvement, as shown by skiagram or clinical evidence or by sputum examinations. These cases are usually tuberculous in origin and as such should receive the same care and treatment as a subject of frank tuberculosis.

Pleurisy with effusion

Diagnosis. The most important diagnostic points are displacement of the apex beat, absence of vocal fremitus and complete dullness. Fullness of the intercostal spaces, impaired mobility, resistance on palpation are not exclusively found in this condition alone but when associated with the first group of signs and symptoms are diagnostic. This abnormality has got to be differentiated from fibroid disease of the lung, massive pneumonia, malignant growths, aneurysm, massive collapse of the lung, pericardial effusion and others. Exploratory puncture where the signs and symptoms suggest may clinch the diagnosis. Skiagram of the chest is of definite use for this purpose.

Exploratory Puncture. The best site for puncture is either the fifth intercostal space in the anterior axillary or sixth space in the mid axillary or seventh space in the posterior axillary or in scapular line in the space just below the scapula. It is a mistake to go too low for this exploratory puncture.

In a two or better five c.c.m. syringe with a fine but long hypodermic needle are taken two to four c.c.m. of a two per cent sterile solution of novocaine. The skin having been sterilised by tincture of iodine the needle is inserted horizontally just beneath the epidermis and a bleb of novocaine made. Then the needle is pushed down more or less vertically and the infiltration of the tissues goes on by gently pushing down the piston and spouting out the local anaesthetic as the needle passes forward. Care is taken to insert the needle just above the upper margin of next rib because if allowed to graze the inferior border of the upper rib in an inter space there is risk of injury to the intercostal vessels and nerves which lie in the groove at the inferior border of the rib. The tissues are thus thoroughly infiltrated by millimeters till the lessened resistance met by the needle shows that the parietal pleura has been punctured. Now once the needle is in the pleural cavity with drawal of the piston will show the presence and nature of the fluid which flows

The syringe should be fitted to the needle quite air tight and the latter be not pushed to the root because it is at the root of a needle where it goes way most easily. If no fluid comes and empyema is suspected a needle of stout bore should be employed. Once fluid is found in the plural cavity, it may be drained by one of the following methods.

TREATMENT

Siphonage The apparatus consists of a big bottle quarter filled

with some suitable antiseptic say one in hundred carbolic or one in thousand hydrochloric acid solution. A rubber tubing having a wide bore needle fitted at the end, is also filled up with the solution. The bottle should be placed either on a chair or on the floor, but invariably at a lower level than the point to be aspirated. The needle properly sterilised attached to the distant end of the rubber tubing is inserted into the chest wall already novocained. The other open end of the tubing is dipped under the fluid in the bottle. Now if the patient coughs vigorously or moderately, a little of the fluid from the already completely filled up tube flows down in the bottle kept at a lower level establishing a siphon action and thus automatically the fluid in the chest flows down and the required amount may be allowed to come out. There is another method of siphonage in which instead of using a bottle quarter filled one uses a bowl or a pan slightly filled with water and the same principles operate as described above. The fluid may easily be aspirated by Potain's aspirator or any other suitable device.

Workers in the line differ in their opinion regarding the amount of fluid to be withdrawn. Scott Pinchin (1934)⁴ is of opinion that one should wait for a few weeks, then should only withdraw part of it unless the symptoms are very urgent. Whereas in Osler's (1935)⁵ book complete and successive withdrawal of fluid is advocated.

But to withdraw so much of albuminous fluid means, making the serum poorer in this fraction of blood, which generally means setting up a condition favourable to the production of oedema and reaccumulation of the effusion specially when the fluid is withdrawn during exudative stage⁶. Hence the fluid should not be withdrawn without due consideration, and preferably when the conservative lines of management have failed to reduce it.

Replacement of Fluid by Air or Oxygen The fluid effusion is replaced by sterile air or oxygen thus producing a pneumothorax, this air or oxygen in its turn is gradually absorbed, allowing the lung to

⁴ Modern treatment in general practice—Edited by Wakely, (1931) Plural effusion p 134 Medical press and Circular publication

⁵ Principles and practice of Medicine Osler (Edited by McCull) 1935 p 622

⁶ Maurer (1936) Brit Med Jour, II p 932

expand slowly. This according to Gravesen (1935) reduces the risk of subsequent tuberculosis of the lung.

An artificial pneumothorax apparatus is used for the air replacement of the fluid. The great advantage is that the amount of air admitted into the pleural cavity can be measured with this apparatus and the intrapleural pressure controlled by the attached manometer. Whenever possible this should be the procedure of choice.

The method

The artificial pneumothorax needle should be inserted about one to two spaces above the aspirating needle and that after aspiration has started for some time, thus ensuring that no fluid can run up the tubing of the A.P. needle. Manometer readings should always control the process. Where oxygen replacement is intended the air bottle is previously filled with this gas.

Another simple method of automatic air replacement. No pneumothorax apparatus is required and this process can be easily utilised in village practice with advantage. A hypodermic needle is inserted either in the novacainised second or third intercostal space in the mid clavicular line and covered with sterile gauze. Air is automatically drawn into the pleural cavity as the fluid is aspirated by any of the means discussed above. This is an effective method and is one of the simplest. Generally in such cases withdrawal of one to three pints of fluid usually suffices. As is generally encountered so also in these cases, withdrawal of even one pint or less not infrequently brings the temperature down to normal and the remaining of the fluid gets rapidly absorbed. The apertures made by the needle should be sealed by collodion or tincture benzoin compound and a pressure dressing applied. A dose of some stimulant medicine, or tea or coffee may have to be exhibited to the patient at the conclusion of the operation. Morphine and atropine may have to be given in cases of resulting or subsequent pain. It is always safe to give an injection of morphine and atropine before paracentesis is started notably in nervous subjects.

Other Methods. Though dealing with an exudate not likely to be absorbed very easily by diuretics, diaphoretics and purgatives yet we are tempted to take resort to them for the first few days. A dry salt free diet, calcium chloride purges iodides, salicylates orally and a high protein diet have caused the fluid to disappear in a number of cases. Some take advantage of the diuretic action of salsify for getting the fluid quickly absorbed. Being an exudate it is not always easy to get the fluid thus absorbed.

Conservative treatment should only be adhered to for a reasonable period, because it is not to be followed when the patient's general condition deteriorates even after proper management. Intravenous injection of iodine solution and calcium gluconate, alternating with each

other, twice a week each, has apparently helped in the absorption of fluid Six to eight injections of each are often adequate Recently most of our cases did well under this and other measures of therapy

Injection of the pleural fluid Some workers favour the subcutaneous injection, of about five to ten c cm of the pleural fluid, provided it is free from tubercle bacilli, once every third or fourth day This is sometimes of use I have found it also useful in some cases

Medicinal treatment

A prescription like the following one, may be of some use,

Calcium Iodide	gr	5
Sodium Salicylate	gr	5
Sodium bicarbonate	gr	10
Diuretin	gr	5
Thiocol	gr	3
Syrup ferri Iodide	in	60
Aqua Chloroformi	ad	1 oz 1

one dose thrice daily

After Care and convalescence Aftercare in all cases of pleurisy is as important as its immediate management The underlying basis of 66 3 percent of idiopathic pleurisy with effusion was, in a big series found to be tuberculous in origin, as diagnosed by skiagram and other modern methods specially by follow up results

At least two years should be the period following an attack of pleurisy, that one should warn the patients and their guardians to be careful about Because it is in this period, that unless great care is taken, they turn to be frank tuberculous subjects

For this, prolonged convalescence⁷ with rest, fresh air, abundance of good nutritious food, codliver oil, butter, milk, eggs, are helpful in getting over the effects of pleurisy easily and to build a good resistance When, the temperature, weight and pulse charts and serial radio grams prove suspicious, the question of sending the patient to a suitable sanatorium should be seriously considered High altitudes with a bracing dry climate is usually better than a sea voyage Such patients of pleurisy generally develop adhesion between the layers of the pleura, making treatment by collapse therapy impossible⁸ Here other surgical lines of treatment may have to be considered, specially when the patient does not improve under conservative lines of management For the details the chapter on pulmonary tuberculosis should be consulted

7 Trul (1935) Brit Jour Tuberc 29 p 192

8 Marshall (1936) Brit Med Jour 11, p 816

CHAPTER XXIX

EMPYEMA

Generally in the great majority of cases empyema develops after pneumonia or bronchopneumonia (metapneumonia) but they may be secondary to septicaemia or pneumonia called syn pneumonic empyema or may develop by contiguity from any wound or sepsis in the thorax or abdomen. Lymphatic or venous drainage may help in the spread. The incriminating organisms are usually pneumococcus, streptococcus and other organisms.

There should always be some suspicion when after the crisis of pneumonia the convalescence as expected is not so uneventful the pulse rate rises there are pain and cough the temperature goes higher and a leukocytosis and other signs and symptoms of sepsis in the body such as perspiration anaemia etc are apparent and also the physical examination reveals accumulation of fluid in the chest.

But there is another variety developing after capillary bronchitis which is rather difficult to diagnose but these infections usually streptococcal in origin may evade diagnosis unless any exacerbation of the signs and symptoms are carefully evaluated and a thorough physical examination a leukocytic count done and a skigram of the chest taken. In the pneumococcal cases the underlying lung is as a rule better and has recovered some functional activity whereas in the other type the pleural infection is generally coincident with a pneumonic change in the lungs.

Diagnosis The diagnosis should be confirmed by anaesthetising the part and aspiration of pus culture and typing of the organism. Next where possible a skigram of the chest should ascertain the details.

TREATMENT

Drugs Solphanilamide group of drugs should be given a fair trial, specially in streptococcal cases.

Indications for aspiration are

(1) When the patient is too ill to stand the thoracotomy (resection of the rib)

(2) When the pus is thin and not purulent

(3) If the underlying lung is found to be the site of primary infection

(4) When streptococci are the infecting organisms

(5) If the skigram shows the effusion to be diffused

If repeated aspirations every alternate days or at two to three days' interval do not keep the temperature down to normal even after ten to fourteen such treatments, free drainage is indicated and thoracotomy should be done. Fitzgerald's¹ (1934) operation is one which is good and deserves a consideration.

TREATMENT

General measures

The mycobacterium leprae are not very highly pathogenic¹. It is only on a system of much lowered resistance, through various causes that the disease gets grafted. Hence in the treatment no effort should be spared in finding out other intercurrent diseases or causes which undermine the health, and such as malaria, syphilis, intestinal worms, gastro intestinal or deficiency diseases, sedentary occupation, unhygienic habits, lack of physical exercise and so on, responsible for lowering the general resistance of the patient, will have not only to be corrected, but also proper steps taken to raise the systemic resistance of the patient by all means.

The principles of treatment observed stage by stage of the disease by Muir^{2 3} (1924 and 1931) are given below:

During the first stage with very few bacilli in the system and the disease strictly limited with little or no acquired immunity, the body resistance should be raised and intercurrent diseases cured and other predisposing causes favourable to the increase and spread of the disease attended to.

(a) Good diet remedying of the intercurrent diseases, change to a healthy environment and socio hygienic atmosphere are useful. Regular physical exercise to promote assimilation and nutrition, thus making the body unsuitable for the development and spread of the lesion is of importance.

(b) Induction of immunity is effected by the injection of suitable antigens. Defatted acid fast bacilli might have been employed with success.

(c) The production of anti substances against the coating of the mycobacterium which (coating) prevents the lytic juices of the system to act on and thus kill the bacilli and lead to cure of the disease, is to some extent accomplished by the injections of esters of fatty acids like Chaulmoogra oil etc. Counter irritation of the asesthetic and other parts is effected by either, (i) infiltrating the esters intradermally or (ii) by painting the parts with one in three solution of trichlor-acetic acid in distilled water every six to ten days. *

During the Second Stage In this stage of the disease, the bacilli are somewhat numerous and very little acquired immunity is developed. There is the risk of local spread of the bacilli but a generalised infection is not unlikely, specially when violent reactions are induced by

¹ (1936) Linct 11 p 391 and 448

² (1924) 1 p 277

³ Roy Soc Trop Med and Hyg. (1931) 25 p 87

injudiciously big doses of injections mentioned above. Hence the importance of giving these injections of the esters of fatty acids very cautiously, in well-chosen but gradually increasing doses. Equally useful if not of greater importance, is the improvement of the general health of the subject in lines indicated above, and also through all other means at our command.

During the *third stage* of the disease the immunity may be either partially or fully formed, and all the above methods of treatment should be followed. Here unlike in the second stage there is very little to be afraid of from a marked reaction; on the contrary often demonstrable improvement follows the induction of a more or less severe reaction, caused by the injection of comparatively bigger doses of the esters.

During the *later stages* of treatment the patient may not show much of a reaction even after the injection of five to seven c.c.m. of the ethyl ester. In such a case the system may be rendered more susceptible to reactions by the oral exhibition of half to one gr. of potassium iodide, once or twice a day, and the dose cautiously increased according to the reaction to be aimed at. So many otherwise refractory cases who fail to react to these somewhat massive injections of the esters readily do so to comparatively smaller doses of it when on very small quantities of potassium iodide. Most of the patients even complain of aches and pains, fever etc. probably due to the absorption of some of the toxins of the microorganism when under iodide treatment. To complete the formation of immunity in the system it appears justified to increase the dosage of potassium iodide to the limit of tolerance of that individual. If much of aches and pains indicating too much of toxic absorption develop the iodide treatment should be stopped temporarily to be resumed again as the condition clears up.

A few words about the details of the reactions caused either by too big dosage of the injections or by too big amount of potassium iodide exhibited orally may be of use to help the doctor in spotting out the danger timely. This reaction resembles the allergic states following injections of tuberculin in big doses. The leprous lesions swell up become inflamed red even angry looking painful new spots may appear, there is fever, aches and pains specially along the course of the nerves. The sedimentation rate of the red blood corpuscles become rather quick indicating a lowered resistance, destruction of tissues and so on. The treatment consists in giving calcium belladonna bromides, ephedrine in suitable doses, as are indicated in the treatment of allergic states.

Tourtelles⁴ (1899) of Paris first used oil subcutaneously in leprosy,

⁴ Ann d Dermat et Syph (1899) Sc I No 3 p 10-27

but it drew little attention at that time. Then Heiser^{5,6} (1914-15) used chaulmoogra, camphorated oil and resorcin by the sub-cutaneous injection with good results. Rogers^{7,8} (1916-17) used various similar preparations and that independently.

In the School of Tropical Medicine of Calcutta following the lines of Muir, the ethyl ester of the fatty acids from *Hydnocarpus wightiana* is used, by *intradermal infiltration* round the anaesthetic patches at several points, starting just inside the areas where the patient feels the prick i.e., beginning just inside the peripheral zone of the area of anaesthesia, starting from a total of about half a c cm gradually increased usually upto five to six c cm. In other types of cases, or after a few intradermal infiltrations, in anaesthetic variety, the ester is injected intramuscularly into the upper and outer quadrant of the buttocks, once or twice a week, according to the reaction produced. One of the most useful in actual practice as found by the writer is the 'Hydnestyle' of Smith Kline & French Co. The other preparations, have unfortunately, not given such good results in my cases. These injections specially at the quiescent period should be increased by half a c cm, because if increased in larger quantities an undesirable and excessive reaction may be excited. The areas infiltrated become swollen and inflamed this begins to subside in three to four days' time. The advantages of infiltration are (a) stimulation of the indolent anaesthetic areas by the local counter irritant action, (b) rapid absorption of the esters being spread over a large area and large number of different areas available for injection.

This intradermal route of injection may have to be supplemented in less reacting cases by simultaneous or alternate intramuscular administration of the drug given in the upper and outer quadrant of both the buttocks alternately.

Pure oil of *hydnocarpus* with four per cent creosote in half to ten c cm, intramuscularly or subcutaneously as suggested, once or twice a week may be effective. Some use a mixture of a four per cent creosote and 0.5 per cent iodine in *hydnocarpus* oil given by the above methods with success. Alepol (B W & Co) starting from one, increased by half a c cm up to five c cm intramuscularly is used by many.

Subsidiary treatment Local application of one in three to five solution of trichlor acetic acid in aqua distillata once every six to ten days on the anaesthetic spots may afford some success by clearing up the lesions. It acts by its counter irritant action.

Potassium Antimony Tartrate in 0.02 to 0.04 g doses in two c cm

5 Amer Jour of Trop Dis (1914) 2 p 295

6 New York Med Jour (1916) 103 p 289

7 Lancet (1916) 1 p 988 Ibid (1917) ii p 682

8 Ind Jour Med Research (1917) 5 p 277 etc

of fresh solution in bidistilled water intravenously every second day or twice a week may do good specially during the phase of reaction and hypersensitiveness. The pentavalent compounds of antimony appear equally useful particularly during this stage of reaction.

I eral A mercurial preparation (B. W & Co) may be given dissolved in the ester or oil in two to five c cm intramuscularly every weekly or fortnightly. Its solubility is 0.5 and 0.25 per cent respectively, in the above solvents specially useful in leprosy of syphilitic subjects.

Dye Preparations Out of the numerous dyes used *fluorescein soluble* in two per cent solution in agar distilled given intravenously in five to ten c cm twice a week is useful. I have used this in five cases of leprosy with good results in combination with other forms of treatment. It is specially useful to cut short excessive reactions.

Pot Iodide Potassium iodide as indicated above is of considerable use in refractory cases along with the injections of the esters.

Protein shock therapy Raw has tried with some good weekly injections of defatted tubercle bacilli (rendered fat free by treating the bacilli either with petrol or ether). Some workers have used dead emulsion of lepra bacilli, others killed cultures of bacillus *pyocyaneus* with good effect. A course of treatment consists of ten weekly injections.

Milk Protein intramuscularly and Vaccines of typhoid group of organisms intra venously starting from fifty million of T & B organisms once a week gradually increased upto two to three hundred million have been tried. These caused much febrile reaction with some ultimate good. But there is the risk of excessive reaction leading to break down of barriers and a generalised spread of the disease. It may be useful in the third stage where injections of esters and potassium iodide orally does not produce the desired reaction.

Intranasal Ionisation Ionisation of the infected nasal mucosa with solution of one per cent sodium hydrocarpate and alcopol or potassium iodide caused the bacilli in the nose to diminish considerably in ten to fourteen days. A current of twenty to thirty milliampères for twenty to thirty minutes applied to each nostril separately and three or more such sessions at biweekly intervals are usually enough to clear up the local infection in the nose. Although somewhat unpleasant, the treatment is borne well even children do not object much to it.

Surgical measures etc Amputation, correction of deformities by massage passive exercise extension, splinting bandaging and so on may be employed. Necrosis may be treated by ultra violet rays, massage diathermy and such like therapy.

In laryngeal affection, local insufflation of cocaine or orthoform, is of use, and relieves pain

Diet etc Diet should consist mostly of fresh fruits, milk, eggs, butter, vegetables etc Not only all the proximate principles should be included in it and also care should be bestowed to add all the vitamins liberally Fish, meat should be taken as desired, but all stale or tin foods should always be avoided Fruits, milk, eggs, fresh vegetables may be of much use Dilute hydrochloric acid and pepsin, in suitable doses after the two principal meals have been found useful by me

Physical Exercise Sufficient physical exercise in the open air, to the extent of getting free perspiration is of signal service for the cure of leprosy of all grades and types It promotes health by assimilation of food The skin gets more supply of blood which helps quick recovery of local lesions

Prevention To be away from the sources of infection, such as lepers⁹ or suspected unclean persons constitutes the main item in prevention Lepers should better be isolated in colonies Begging in the streets, handling of foods, keeping of shops of clothes, toys, medicines etc , by lepers should be prevented Servants, prostitutes, vendors of food, drinks etc , may prove to be good sources of spread of the infection Children should be segregated early Infected persons should be treated promptly Something like an ideal leper colony is probably the one at Philippine Islands near America

CHAPTER XXXI

CHOLERA

DIAGNOSIS—

Clinical Types of Cholera. Clinically there have been numerous classifications of the types of cholera. But the manifestations of the disease depend mainly upon the resultant of the two fighting forces, namely, the nature, dose, virulence of the vibrios and the resistance of the individual infected. This resistance may be local in the intestine, or systemic and general.

The clinical types usually described are:—

- (1) Choleraic diarrhoea
- (2) Simple sporadic cholera
- (3) Ambulatory cholera
- (4) Malignant cholera
- (5) Dry cholera or Cholera Sicca

History of the case. In an average case of cholera the history is something like the following:

The patient retires for the night in good health after partaking a suspicious or good meal. Late at night he is aroused from sleep by a slight discomfort in the abdomen round the umbilicus, thus indicating the site of mischief etc to be in the lower part of the small intestines. He passes almost a normal motion which is effortless. Then again another one in a few minutes time. Thus gradually the motions tend to be bileless and assume more or less a rice-water character. He develops weakness out of proportion to the number of motions. Vomits may follow or precede them. The vomited matter also tends gradually to be without any tinge of bile. The urine becomes gradually scantier till in bad cases it is totally suppressed. Generally griping pain etc are singularly absent in an average case of cholera. The weakness out of proportion to the number of stools, is very suggestive. Then follow the burning sensation of the body, thirst, weakness, cramps etc.

Other points helping diagnosis are signs of dehydration washer-woman fingers, eye sockets hollow, with anxious look, prominent cheek bones. There is a characteristic shrivelled up appearance. Later on one finds cyanosis and cramps the patient may thus slowly pass into coma.

Gradually at the later stages the patient may either come round in favourable cases, or may take a worse turn or some of the other serious complications may supervene.

Some important signs & symptoms.—

Vomiting. The first few vomits contain bile and semi or undigested food material, but gradually they assume rice-water character without traces of bile. Generally the vomits are also effortless like the stools.

Purgings. Except the first few which may contain faecal matter and be coloured with biliary constituents, the motions gradually assume the typical rice-water character, though they too are effortless from the very beginning.

When this characteristic cholera stool is held in a conical urine glass or in a test tube it separates into two layers. The upper one consisting of ashy grey watery serous fluid and at the bottom of the lower a flocculent granular layer of the shreds of epithelium and shedded intestinal mucosa. Faecal matter bile blood and mucus all are generally lacking in it. But there may be in very severe cases a uniformly pink tinged stool and this is by no means rare and may be encountered in up to even twenty percent of patients in some epidemics. The stool in these cases is watery and homogeneous like that of cholera except that it is of a uniform pink or frank red tinge.

Cramps, may be agonising and are more marked in the muscles of the extremities and the abdomen.

Temperature Though the axillary temperature falls several degrees below normal yet the rectal temperature may be even as high as 104°¹. The higher the rectal temperature the worse the prognosis, besides other factors.

Collapse (1) May be due to loss of fluid and it manifests itself in form of intense dehydration as indicated above.

(2) Or the collapse may be due to cardio vasomotor weakness. This is specially the case in the subsequent collapses.

The first few collapses are generally due to loss of fluid as indicated by the raised specific gravity of blood from the normal figure of 1056 it may go even up to 1064 or more indicating treatment by saline infusions. In children normal specific gravity of blood is near about 1058.

But in the subsequent collapses the cardio vasomotor weakness plays a correspondingly greater part. Here, inspite of severe collapses the specific gravity of blood is not materially raised.

How to take the specific gravity of blood

For the purpose of taking specific gravity easily, one can prepare a solution at the body temperature of a specific gravity of 1000 by mixing one part of saturated distilled water solution of magnesium sulphate in four parts of aqua distillata.

In a 2 c.c.m sterile and dry syringe with a fine needle one draws a little blood from the vein of a cholera patient the clean tip of the needle is immersed at the mid zone of the standard fluid made by the above method and by a very gentle push of the piston a tiny drop is made to float in the fluid. If the drop sinks the specific gravity of the blood is higher and if it floats it is lower than that of the standard fluid. One capillary pipette with a suitable teat attached to it serves the purpose.

Blood Pressure Regular blood pressure reading of the patient is also invaluable for scientific treatment of cholera. It is only by recording carefully the blood pressure and specific gravity of blood that one can ascertain whether the cause collapse in a particular case lies in loss of fluid and consequent dehydration or is due to cardio vasomotor weakness as indicated by an abnormally low blood pressure but with a more or less normal specific gravity.

Scanty or suppressed urinary secretion

There may be scanty urine or complete anuria with uræmia.

The signs and symptoms are coated dry tongue suppression of urine, irritability or undue calmness of temper with red congested eyes or apathy,

even court may close the picture. The respiration may be increased in depth and frequency and the patient may show even convulsion with a tendency to be boisterous.

Probable causes which conduce to uræmia are

(1) **Raised specific gravity of blood,** which is somewhat unsuitable for the secretion of the kidneys. An altered crystallloid and colloid content of blood, besides others prevents proper secretion.

(2) **Raised nonprotein nitrogen content of blood.** "The nonprotein nitrogen content of blood in 66 cases of cholera has been investigated by D R Dhar and P C Adhyee who found a high reading to be associated with fatal post choleric uræmia but a low content to be of good prognostic significance. The importance of early treatment to prevent renal stasis is emphasised ?

(3) **Toxic action on the Kidneys** The toxin of cholera may actually produce a cloudy swelling of the kidney cells.

(4) **Delay in starting treatment.** The greater the delay the worse is likely to be the uræmia.

(5) **Too low blood pressure** The longer the patient is allowed to continue with too low a pressure of blood the worse is the uræmia. There must be a minimum pressure essential for the secretory activity of the kidneys.

(6) **Loss of alkali reserve and acidosis.** This is certainly an important factor again in the production of uræmia.

(7) **Prolonged Collapse** By circulatory inadequacy in the kidneys and also by chilling and cooling of skin over these organs, uræmia may be precipitated.

So Clinically—

(1) History seasonal prevalence cases in the neighbourhood or in the family history of exposure the more or less typical signs and symptoms, of special importance amongst them being the dehydrated appearance weakness out of proportion to the number of the stools burning sensation thirst cramps etc. Bile less or rice water character of the stool and vomits, anuria etc.

(2) The following laboratory methods amongst others are also useful diagnostically.—

All bacteriological examinations aim at detection of the vibrios in the stool Cholera red reaction agglutination test relative and absolute increase of red and white blood cells specially large mononuclear variety of the latter Raised specific gravity of blood etc.

Prognosis of a case Generally depends besides other factors on age the extremes being bad severity of the attack quick onset of collapse the longer the collapse before starting treatment the worse is the prognosis cases showing repeated collapse anuria or uræmia high rectal temperature persistent tympanites, distinct cardio-vasomotor weakness all are of serious import Alcoholics opium eaters and nephritis all fare badly Pregnant patients generally miscarry.

Differential Diagnosis. Differentiation has got to be made from severo diarrhoea algal malitia, food and arsenic poisoning bacillary dysentery and so on.

TREATMENT

Prophylaxis Inoculation of cholera vaccine confers short lasting protection Kasauli type of vaccine in India, 8000 million organism per c cm, first dose half a c cm, and seven to ten days later one c cm for an adult are suitable Protection usually is effective for six months Bili vaccine can be taken orally, but it is not so sure as the absorbability of persons vary, hence there may be some uncertainty in effect

House, premises, and the vicinity should be kept sanitary Solids and liquids should be boiled before taking No raw things, specially if of unknown or suspicious sources should be taken Ensure protection against flies and their contamination

For the doctor, besides the above, he should be careful in handling cases Hands and nails should be kept clean, empty stomach may conduce to infection Even slight diarrhoea should receive prompt attention

As a prophylactic in cholera and for the treatment of summer diarrhoea, a prescription like the following is often effective

Acid sulphuric dil	m	6
Acid hydrochloric dil	m	10
Glycerine	m	15
Aqua	ad fl oz	one
one dose twice or thrice daily after meals		

CURATIVE

Treatment of Cholera The principles involved in the treatment are—

- (1) To kill the organisms and to neutralise or destroy their toxins
- (2) To treat the symptoms and complications as they arise

DRUGS WHICH ACT BY DESTROYING TOXIN AND KILLING THE VIBRIOS

Potassium Permanganate Rogers³ (1915) used due to its oxydising properties It is generally given in salol or keratin coated pills or with kaolin They should be fresh, otherwise pass out of the intestines undissolved, act by oxydising the toxins and by destroying the vibrios

Generally two grain pills made by kaolin and vaseline, coated by keratin are given two at a time, every fifteen minutes, for the first two hours, then two pills every half hourly till the stools contain altered bile and the patient's general condition improves

Nowadays they are not much in vogue as they are irritants and their corrosive action on the intestines is also not to be overlooked They are worth while trying, specially in out of the way places,

³ Rogers (1915) The Lancet n p 219

where other modern methods are not so easily available. They are simple to administer.

Kaolin Kulne⁴ (1918) was one of those who introduced it in the treatment of cholera. It acts by adsorbing⁵ toxins⁶ and preventing their absorption in the system. The vibrios also get mechanically entangled in the mass and thus kaolin acts beneficially.

It can be given in the form a thick emulsion of one part of kaolin well stirred in three parts of water. One makes the patient drink as much of this as possible, the more he takes the better.

It can also be given in the form of a thick paste made up of one pound of kaolin in a pint of water. The patient should be made to take so much kaolin that it should come out in the stool.

Osmo Kaolin may suitably be given in the following way,—

Osmo Kaolin	10 ounces
Glucose	2
Water	make up to a pint

Stir well and make the patient drink this as much as he can, preferably four to six pints in twenty four hours.

Though kaolin when given in massive doses is of use due to its unpalatability the patient will often refuse to take it or even vomit it out after taking. It appears to be of some use in the treatment of cholera.

Castor Oil and Kaolin Sometimes when much kaolin has been given a dose of castor oil say in two to four drachms may help in expelling the entangled vibrios and also the toxins.

But in cholera there are nausea and vomiting in most cases and the administration and retention of drugs orally are often problems. Seldom will the patients retain them, even when cautiously exhibited, hence comes the difficulty of this form of treatment, though worth trying, specially in suitable cases.

Acid Treatment—

Dilute hydrochloric acid in ten to twenty drops every fifteen minutes to half an hour was tried, by some workers with the idea of so changing the reaction of the small intestines that the vibrios would not be able to flourish therein. This method though not of much use as a curative in cases suffering from cholera yet may serve successfully as a prophylactic in combination with dilute sulphuric acid.

Hydarg Subchloride (Calomel)—

When there are nausea and vomiting a prescription like the

4 Kubne (1918) Romanio Generama 38 p 521

5 Dhar & Sen (1929) Cal Med Journal August

6 Dhar (1930) Cal Med Journal November

following may be of service, and is usually given as a routine method nowadays

Hydrarg Subchloride	gr	$\frac{1}{8}$
Camphora	gr	$\frac{3}{8}$
Menthol	gr	$\frac{3}{8}$
Chloretone	gr	1
Sodn Bicarb	ad gr	4

One powder, every half an hour from the very beginning of cholera

Eight to sixteen of the above powders may be given in the majority of adult cases and fewer for younger patients at first, every fifteen minutes to half an hour, later, every two hours or at longer intervals

In this powder menthol and camphor in too small a dosage to influence the heart, are likely to be of use in tympanites. Chloretone is of service in nausea and vomiting. Where these symptoms are lacking, simple hydrarg subchlor powder without menthol and chloretone may be given.

Hydrarg subchloride acts in cholera by drawing bile, into the gut, one of the best and natural intestinal antiseptics, and is lacking in cholera. It acts as an intestinal antiseptic, as well as an anti-emetic in small fractional doses. The use of chloretone is objected to by some on the plea that it is a cardiac depressant. There may be some remote possibility of mercurial poisoning in cases of anuria and where the drug is absorbed to a great extent.

Volatile Oil Mixture Essential Oils were used in the treatment of cholera in India from a long time

Tomb⁷ (1919) treated a number of cases by the following mixture with good results

Oil Cloves			
Oil Cajuput			
Oil Juniper	as m	5	
Spirit of ether	m	.50	
Acid Sulph Aromaticus	m	15	
Mucilage	q	s	
Aqua Distil	ad fl	or one	-

One dose every half hourly till purging and vomiting ceased

This mixture contains very strong volatile oils which during their excretion are likely to irritate the kidneys. As the toxin of cholera damages the kidneys, any further source of irritation of these important organs of excretion has got to be reasonably excluded.

Though of some use in a case of mild cholera specially at its earlier stages this mixture appears to have no appreciable use unless associated with saline injections, once the patient is in a stage of collapse

TREATMENT OF SYMPTOMS AND COMPLICATIONS

Alkaline Mixture

Besides the above one may give a simple alkaline stimulant mixture like the following, provided the patient can possibly take it. The constant nausea and vomiting may interfere with oral medication. In order to prevent these the powder containing fractional doses of hydrarg subchloride menthol camphor and chloretone mentioned above in repeated doses is of some use.

The following is an example of an alkaline stimulant mixture

Liq Ammon Acetatis	m 120
Pot Citrate	gr 30
Spt Etheris Sulph	m 20
Tr Nux Vomica	m 6
Syrup Aurenti	m 60
Aqua distil	ad fl oz one

One dose every two hours, or as desired

This mixture if retained, will reduce acidosis and will help in establishing the flow of urine and may act as a mild stimulant.

Collapse

Collapse should be treated according to the cause

Composition of commonly used rectal saline —

Sodium Chloride	gr 80
Sodium Bicarbonate	gr 60
Glucose	oz 1
Aqua distillata	ad pint one

Four ounces, high up rectally, by Murphy's drip method, every two to four hours, according to indication In children about two ounces at a time, at the same interval

Intravenous Transfusions of saline given by this route is the quickest and the most effective means of combating collapse due to loss of fluid

Salines may be given by the closed method It means without cutting open the vein This is the ideal way of giving intravenous saline and is only possible in cases where the collapse is not profound Cases of cholera, are preferably treated by closed intravenous saline transfusion before profound collapse sets in The great disadvantage of allowing the patient to pass into a collapse, is in the failure of the kidneys to work for want of an optimum pressure of blood and due to excessive loss of fluid etc Before these valuable delicate excretory organs are much damaged by collapse, dehydration and other factors, saline transfusions should be administered Given before profound collapse sets in, they are actually found in practice to be of greater service to the patient than salines given at the later stages under profound collapse Smaller amounts of saline in cases without collapse will do a greater good than larger amounts given at the later collapsed stages

Not only this, the *risk of sepsis* of a wound in a system with lowered resistance due to cholera is also not inconsiderable and it is probable in cases where salines are given by opening up a vein

Open method But in cases where the collapse is pronounced, as generally is the case when doctors are called it may not be possible to give saline by the closed method In such cases saline is given generally by cutting open one of the big veins at the elbow, rendered prominent by tying a rubber tubing above, and with all sterile precautions, the skin over the most prominent vein is cut open and dissected out With an ordinary forcep the vein is held up and it is ligatured by silk below and distally About half an inch or just a little above this point ligated, one makes a slit like apperture obliquely cutting open half of the circumference of the vein and a suitable canula inserted The canula thus introduced can be fixed by another loop of the silk without completing the knot, this prevents the canula from slipping out The wound should be covered by a piece of sterile gauze and the arm should not be allowed to be moved, as this will help the canula

to come out and spoil the whole process, necessitating the trouble of its reintroduction

Practical facts Though the open method is admittedly more risky than the closed method, yet in the vast majority of cases, when the doctors are called in, the patient generally is in the stage of collapse, leaving no other alternative than to take recourse to the open method. If the case is judiciously managed, one can give repeated injections in the same once opened up vein. Practically one has given saline thrice at a few hours interval in the same case by only opening up the vein once. But such happy results are not always possible.

After transfusion is over the parts should be touched with tincture iodine and the vein ligatured. The skin should be stitched up touched with iodine and properly bandaged, and due aseptic care taken, as there is always a risk of sepsis and even cellulitis developing.

How much saline is to be given? Generally the raised specific gravity of blood, indicating loss of its fluid constituent, is a workable guide, as to the amount of intravenous saline to be given in a particular case.

When the specific gravity of blood is near about 1064, generally for an adult, about three pints or less intravenously and about one pint subcutaneously is adequate and actually proves effective. When the specific gravity is near 1067, three pints or two and a half pints given slowly or two pints per vein and one pint subcutaneously will generally prove sufficient. For 1060 specific gravity of blood, about two pints may prove adequate. For 1058, one pint per vein or in the absence of urgent signs and symptoms only one pint subcutaneously may prove enough. Subcutaneous salines though not very rapidly absorbed are more lasting in effect.

In the human system, as in other forms of treatment, there cannot be any fixed formula, so every individual case of cholera need be treated on its own merits and indications etc and that after due consideration to all the aspects of the case.

Generally it is now admitted by all workers that more than three pints of saline intravenously at a sitting, is injurious specially in view of the fact, that the patient's cardio-vasomotor apparatus has been used to a smaller volume of blood, and if on this system suddenly a large bulk of fluid burden is thrown, it may fail to work properly and the subsequent vasomotor weakness may be unduly enhanced. It is better to repeat the transfusions frequently than to give more than three pints intravenously at a time. These intravenous transfusions when reinforced and fortified by subcutaneous and rectal saline injections, having lasting effects afford some what better results.

Rate of flow of saline Though generally four ounces per minute or a pint in five minutes is the usual rate of flow of saline advocated,

yet to most recent observers this is too quick a rate, specially for the enfeebled system, and for the weakened cardiovasomotor mechanism

As the fluid of the system lost in cholera is rather gradual, so the ideal of treatment theoretically should aim at replenishing the fluid very gradually. For this purpose, the slower the inflow of saline the better is the result.

From clinical experience on actual cases one has found invariably, that large quantity of saline given quickly is less effective than comparatively smaller amounts given slowly. The quicker injections, even of the best hypertonic saline, almost always result in quick evacuation of bowels, followed by corresponding quick collapse. Slow intravenous salines always give better results, as compared with the quicker ones.

Temperature of the saline to be given. Before the saline injection is given the patient's rectal temperature should be taken. When it is near about 103° or 104°F it is always unsafe to give intravenous saline. It is definitely indicated in such cases that the body temperature should be lowered down by either, ice cap, cool sponging or cold packs or by iced rectal salines. After the rectal temperature has come down to about 100°F or there about, room temperature saline, that is, saline having a temperature of near about 80°F can profitably be given. When the rectal temperature of the patient is about 98° or 99°F the temperature of the saline should also be about the same, that is, about 98°F. If the collapse has been for a longer time and the patient's rectal temperature is 97°F the saline should have near about 100°F or a little higher temperature. As a matter of clinical experience on several hundreds of cases one has noticed hyperpyrexia or other unpleasant reactions following transfusion of saline, to be much less comparatively in lower temperature salines than in those having higher temperature, as was advocated by former workers.

When to stop. Always the patient should be watched very carefully. So long as he receives the saline comfortably or when he falls off to sleep, one should continue the transfusion. Once the pulse is full and up to the desired volume, tension and pressure, one may stop further inflow. Sometimes, rigor or other troubles may necessitate temporary cessation of the injection but they generally pass off, specially if occur at the beginning of treatment. This means either too rapid an inflow or higher temperature or some cardiovasomotor weakness or some other trouble. But there are some contra indications of saline infusion. These are —

- (1) Severe headache
- (2) Precordial distress
- (3) Cardiac embarrassment
- (4) Severe rigor
- (5) Marked restlessness
- (6) Oedema lung

The above group of troubles should be taken seriously and the rate of flow much reduced and the effects watched, if even after that the complaints persist the flow of saline should be stopped for the time being and the effects noted. Once they have passed off, slow transfusion may be resumed once again, and that with greater caution. If the above symptoms reappear or persist serious consideration should be given whether to stop saline infusion permanently. In such cases subcutaneous and rectal saline may prove life saving.

When to repeat salines Transfusions may be repeated any number of times, according to indication, specially when the collapse is due to loss of fluid, as directed by the raised specific gravity of the blood.

But one should carefully bear in mind the fact that during the later collapses i.e., from the third or fourth or subsequent collapses, the cardio vasomotor weakness plays a proportionately prominent and relatively greater role, as is shown by the fact that specific gravity of the blood remaining near about normal the patient passes into a collapse. This indicates some cardio vasomotor weakness and intravenous saline transfusions specially of a bulky nature may in these subjects, even help in causing rapid death of the patient. Under such circumstances cardiac and vasomotor stimulants are as a rule indicated. As a matter of practical experience, it is here that the doctor feels hopeless and nothing may be of any use to the patient. It was this condition that the late Dr. Ganguly, of the Campbell Hospital used to dread and that with justification I also have to admit that most of us who have some experience in the treatment of cholera, will feel helpless in such cases, because in spite of our vaunted remedies very little could be done for the patient.

But luckily when cases are managed early and carefully such embarrassing stages are not very common. These cases with most dangerous subsequent collapses are more common at the beginning of a bad epidemic, where all medical efforts, generally prove of no use. This does not however necessarily mean that we should hold our hands up in horror. In fact this is the time to utilise all the resources of the medical stock, for the sustained stimulation of the cardio vasomotor mechanism.

WHAT SHOULD BE THE STRENGTH AND QUALITY OF THE SALINE?

The various types of salines are —Normal saline, containing ninety grains of sodium chloride to a pint of freshly prepared distilled water. Hypertonic saline should contain one hundred and twenty grains; hypotonic sixty grains of sodium chloride to a pint of fresh redistilled water.

Alkaline saline may contain hypotonic saline one pint with about one hundred and twenty to one hundred and eighty grains of sodium

bicarbonate per pint. Normal or hypertonic saline with above mentioned amounts of sodium bicarbonate to each pint may also be used in suitable cases. To any one of these salines one may add the desired amount of sterile glucose solution required for that particular case. The original hypertonic saline of Rogers consisted of sodium chloride one hundred and twenty grains, calcium chloride four grains, potassium chloride six grains, sterile distilled water one pint. But now a days the potassium chloride is generally omitted. Calcium can be given separately in the form of gluconate, and so on.

The above solutions should all be properly sterilised before transfusion.

Hypertonic saline was justly advocated by Rogers in cholera, because with the fluid stool much of the sodium-chloride also is bound to be lost. In order to retain fluids in the system, unless enough sodium chloride was made to be retained in the tissues, the dehydration could not have been combated. Not only this, when tissues retained some fair amount of salt, for its proper dilution water also would be necessary and thus not much water would be left to flow into the intestines to give frequent watery evacuations. Probably salt acts as a detoxicating agent by combining with the cholera toxin circulating in the blood and this substance may be excreted easily by the kidneys later on.

Personally one has used *one per cent saline* in bad cases, specially for the earlier repeated collapses with gratifying results.

Salt solutions given per vein also tends to lower the invariably raised non protein nitrogen content of blood, in cases of cholera.

Reduction of alkali reserve in cholera Sellards and his co-worker⁸ (1911) showed that there was considerable diminution in the alkali reserve of the system, in cases of cholera specially at its later stages. This work was also substantiated by the investigation of Rogers and Shorten⁹ (1915) in, the then cholera wards of the Calcutta Medical College hospitals.

Alkaline saline For clinical purposes, one has found better results when transfusion of alkaline saline with glucose is started early than otherwise. This is all the more indicated where there is scanty urine or anuria.¹⁰

Alkaline saline with glucose When uremia is threatening saline containing glucose, six drachms, sodium chloride two drachms, sodium bicarbonate three drachms to a pint of freshly prepared distilled water and properly sterilised, given per vein, may be of good

⁸ Phil Jour of Sc Sect B Med Sci, (1911) 6 p 53

⁹ Ind Jour of Med Research (1915) u p 867

¹⁰ Rogers, (1917) Lancet u p 745



service Generally one pint of the above saline may be quite enough for the time being, but in some bad cases even upto one and a half to two pints may have to be given. In cases of acute uræmia ten to fifteen ounces of a four to seven percent sodium bicarbonate solution in distilled water, better in normal saline, may have to be given. Now a days one can get ready made ampoules of seven and a half percent solution of sodium bicarbonate for immediate use in these cases. One of the best guides as to whether more sodium bicarbonate is to be given in a particular case is to be found in the reaction of the urine. If the urine, even if a drop of it is available, and is acid in reaction to litmus paper, one may safely push more alkalies. One can affirm from clinical experience that enormous quantity, say even thousand grains of sodium bicarbonate may have to be given in these uræmic cases before the urine is properly secreted and is rendered alkaline.

Preparation of Alkaline Saline Sodium bicarbonate when boiled with water becomes carbonate of soda by the liberation of carbon dioxide. Even when added to very hot sterile saline carbon dioxide may partly be evolved out thus changing a part of the bicarbonate of sodium into a carbonate of sodium which is injurious to the system.

Dry powder of measured quantity of pure sodium bicarbonate, can with ease, be backed on an aluminum or some metallic dish over the flame of a spirit lamp and thus sterilised before being added to slightly warm sterile saline, just ready for use.

Dry autoclaving in packets may also sterilise the sodium bicarbonate powder, thus making it ready to be mixed with sterile saline. Calcium chloride, by forming a precipitate with the alkaline saline is incompatible when added to it. Calcium can be given separately according to indication either in the form of gluconate or in other forms. Alkaline saline should never be given subcutaneously or intra muscularly as it causes the most severe and dangerous sloughing of the tissues, when so given. This fact should never be lost sight of.

A few practical details In all cases of cholera, specially with collapse, due to dehydration there is much need for water in the tissues and as already discussed there is always some loss of the alkali reserve in the system. There is some hepato renal derangement also from the very beginning.

To counteract all these the routine plan followed had been to give about a pint or half a pint, according to the severity of the dehydration etc., of the alkaline normal saline with glucose first, then in the same sitting, through the same apparatus one and a half to two pints of either Roger's hypertonic or one percent saline solution according to the indication of that individual case. The rationale is that the hypotonic alkaline glucose saline having six drachms of glucose, three

drachms of sodium bicarbonate and one drachm of sodium chloride to a pint of freshly prepared distilled water, when given initially, goes a great deal to build up the alkali reserve and even to prevent acidosis and help in the output of urine. It also gives ready food and fuel to the heart and the exhausted and dehydrated system. This besides other effects tends to counteract the hepato renal derangement generally associated with cholera. It was formerly thought that the cholera patient suffers mainly from the effects of loss of sodium chloride certainly that remains yet the basic factor, but besides that principal one there are certain side issues of considerable importance which require rectification too. Those are to maintain the alkali reserve up to the normal standard in the system of the patient, and to keep up the osmotic tension and the glucose content and pressure in the blood vessels in such a way that the vital organs can work to their best advantage. The beneficial effects of glucose are convincing, hence it is advocated from the very beginning of treatment with alkalies along with the sodium chloride and water instead of its use being deferred to a subsequent period.

As a matter of experience one gradually finds that early administration of glucose alkalies and hypertonic or even one percent saline started from the very beginning of collapse in cholera appears to give better results than those to be got by the older methods of treatment of only hypertonic saline transfusion followed by the subsequent use of alkalies. Though the latter method of treatment is quite effective yet the above described recently followed method appears to work better. Injections of medicines given subcutaneously or intramuscularly during the collapsed state may fail to be absorbed but their subsequent absorption at the time collapse is combated may lead to symptoms of poisoning in rare case. This fact needs be borne in mind.

Type of saline to be given with reference to the duration of the disease and condition of the patient

1 When the collapse takes place in a few hours, say in three to six hours after the onset of the disease not with marked anuria but with raised specific gravity of the blood hypertonic saline is mainly indicated but to prevent uremia and other complications it is better that along with the hypertonic saline one should give about half a pint of alkaline glucose saline. The quick onset of collapse indicates much loss of water and salt, hence hypertonic saline besides the glucose in alkaline saline is to be used.

2 If the case is of six to twelve hours duration with markedly raised specific gravity of the blood and intense dehydration one should preferably give not only hypertonic saline but also along with it about a pint of either isotonic or even hypotonic alkaline saline with glucose.

The rationale of giving either isotonic or hypertonic alkaline saline with glucose, is based on the fact that the salt requirements having been satisfied by the hypertonic saline what is left to be guarded against is the oncoming of complications, and hence the idea of giving not so much excess of sodium chloride as of fluid, alkalies and glucose.

3 When collapse sets in after twenty hours of the onset or later indicating no marked loss of salts from the tissues points, not only to the need for salt and water, but due to loss of alkali reserve, there is also a great requirement for alkalies and glucose.

In such cases one should mainly depend on isotonic alkaline glucose saline supplemented by proportionally smaller amounts of hypertonic saline. To cite a particular example say in a case of collapse in cholera after twenty four hours of onset with a specific gravity of 106, indicating the need of transfusion of about three pints of saline, it appears better that two pints of isotonic alkaline saline with glucose should be given along with another pint of hypertonic saline per vein. The need of calcium is greater in such cases in fact the longer the duration of collapse the greater the requirement for it is.

Repeated Collapse When repeated collapses occur at short intervals one should expect considerable loss of sodium chloride from the system, because in the presence of sufficient amount of sodium chloride which tends to keep water in the tissues such repeated collapses would be very unlikely, hence in a case in which repeated collapses take place in a few hours time after the onset of cholera there is greater indication of giving hypertonic or even one per cent saline first, then alkaline hypertonic saline with glucose. The amount will vary according to the specific gravity of blood, blood pressure, degree of dehydration, presence of cramps or not etc.

Every cholera case is a potential uranil, because it is now quite well known that, purging and vomiting in normal individuals lead to depletion of chlorides, and a raised non protein nitrogen content of blood results. If in such cases sodium chloride is supplied to the system, the non protein nitrogen content of the blood comes down automatically. Hence in cholera the hypertonic saline justly advocated by Rogers is undoubtedly the most important item in the treatment but the effects of loss of reserve alkali of the system and the salutary results of glucose per vein in such cases can not also be lost sight of.

Calcium is specially indicated in these cases of repeated collapse as it tends to lower the permeability of cells, and also due to its other beneficial effects

Conditions where intravenous Saline is either contraindicated or should be given with caution

- (1) High rectal temperature
- (2) Weak heart, or in elderly persons or in valvular damage, in epidemic dropsy with weakness of the heart Oedema of the tissues etc
- (3) In subsequent collapses, where the specific gravity of blood is not raised, but the blood pressure is low, here the most probable cause of collapse is in cardio vasomotor weakness
- (4) In pulmonary complications, or in the presence of lung diseases or in oedema lung etc
- (5) In marked tympanites
- (6) In pregnant patients of cholera
- (7) In weak, children, it should be given with care, or only subcutaneously

REACTIONS FOLLOWING INTRAVENOUS SALINE TRANSFUSION

RIGOR

Probable causes

- (a) Discrepancy between the temperature of the saline and that taken in the rectum, lower temperature of the saline does not cause so frequent rigors, hence the remedy lies in giving saline at a comparatively low temperature
- (b) Too rapid flow of the infusion probably by (i) irritation of the vascular endothelium (ii) rapid distension of the capillaries
- (c) When the concentration of the saline is too high
- (d) If the distilled water is old, the bacterial bodies grown in the water cause mild protein shock, specially as the water goes directly into the veins Hence the importance of giving salines prepared in fresh distilled water wherever available
- (e) The intravenous saline transfusion is not an unmixed blessing because once the circulatory equilibrium is established, toxins from the intestines are absorbed, and may be one of the factors in giving rise to the rigor This toxin absorption was not possible due to the collapse and consequent insufficient circulation, but as soon as circulatory adequacy is restored the toxins get absorbed, systemic manifestation may appear in the form of a rigor or other injurious signs and symptoms Hence rigors should be treated by due attention to the above causative factors

Hyperpyrexia, when observed by taking rectal temperature, before starting treatment, as is not uncommonly seen in cholera amongst Europeans, must be brought down by either cold sponging or ice packing or iced rectal saline, and after the rectal temperature

has come down to near about 100° or 101°F then room temperature or even preferably cool saline, at about 60° to 70°F may have to be given.

We have found as a matter of experience that it is far better to leave the patient alone in the collapsed condition and to give only subcutaneous or rectal saline, than to give intravenous saline transfusion in cases with high rectal temperature.

If one can avoid rigor by eliminating its other promoting factors, hyperpyrexia too becomes far less frequent. As a matter of fact, only by giving salines at comparatively low temperature, much of the frequently met rigors of former days, have been minimised.

Subcutaneous Saline

Indications

- 1 In cases of evidence of cardiac weakness, or damaged heart with valvular disease etc where intravenous saline may even kill the patient.

- 2 In the presence of any pulmonary trouble When the specific gravity of blood is raised and there is either bronchitis asthma, or chronic catarrh only small amount of intravenous saline should be supplemented mainly by subcutaneous routes.

- 3 In the presence of hyperpyrexia with a raised rectal temperature, there is considerable risk in giving saline intravenously unless the temperature of the patient is first lowered down. In such cases subcutaneous saline should be given first, then when the rectal temperature is low and according to indication some intravenous saline may be given, with care, as in hyperpyrexia higher temperatures may be induced by intravenous saline.

- 4 In cases where collapses succeed rapidly, the intravenous saline should be supplemented by those given subcutaneously. Here though the absorption is slow, yet the effect is more lasting.

- 5 In cases where the specific gravity of blood is not much raised and the symptoms are not very urgent, subcutaneous saline injection, is one of choice in treatment.

- 6 In cases of bad tympanites intravenous saline should be given with much caution as it may render the condition worse.

Site to give subcutaneous saline The best place to give subcutaneous saline is under the skin of the abdomen or the outer side of the thigh or in other lax tissues of the body. In women, under the skin by the side of the breast or in the lax tissues of the abdomen.

It should be noted that, in cholera the local and systemic resistance of the body is much lowered and the tissue damage is also not inconsiderable at sites where big amounts of subcutaneous saline are given, unless very scrupulous antiseptic and clean methods are followed, there is a constant risk of sepsis.

Some disadvantages of subcutaneous saline (i) It is slow in absorption, but more lasting in effect

(ii) Sepsis and even cellulitis are not uncommon unless careful aseptic measures are taken

(iii) Very painful

(iv) Preferably only isotonic saline should be given subcutaneously
Hypertonic saline though it causes some irritation of tissues locally, may also be given subcutaneously

CHOLERA IN PREGNANT WOMEN

Pregnant patients of cholera nearly always miscarry This is almost invariable in all severe attacks One out of our fifteen cases did not do so What factors in the treatment can prevent this, it is difficult to say Generally, if proper treatment is begun, quite early in the disease, the risks may be, to a great extent, minimised

In the treatment of cholera in pregnancy, one mainly depends on subcutaneous saline, unless the symptoms are very urgent Even where symptoms are urgent one should be very cautious in giving more than one pint of alkaline glucose saline per vein The rest of the saline even a hypertonic one may be given subcutaneously The intravenous saline should be given as slowly possible

The ideal treatment would be to give subcutaneous saline before dangerous collapse starts, i.e. as soon as the specific gravity of the blood shows a rise by a few points, and signs of moderate dehydration become manifest The intravenous, preferably the closed method, being left only for alkaline glucose saline in small amounts, at more frequent intervals Calcium gluconate and glucose every few hours per vein is specially indicated in these subjects Subcutaneous saline injections should be supplemented and strengthened by regular Murphy's drip method of alkaline saline with glucose, given rectally

SALINE IN CHILDREN

In children inspite of very severe collapse the specific gravity of blood may not be raised much above normal One may see quite a good percentage of pulseless children in cholera, with a specific gravity of blood near about 1060 to 1062, or even lower As a rule children, whose volume of blood in the system is comparatively small tolerate intravenous salines rather badly, hence even where symptoms are very urgent not more than as many ounces as their year of age, should be pushed It is always better and preferable that children should receive saline subcutaneously and rectally, the latter route being specially suitable for alkaline glucose normal saline Sodium bicarbonate in a four percent or the ready made ampoules of seven and a half percent solution available now a days, prepared by some dependable

firm, may be mixed up with suitable amount of sterile glucose solution and given intravenously where there are indications of uremia, anuria, or in fully developed uræmia

Amount of Saline in Children The safe plan, as to the amount of saline to be given, is roughly by the age One generally gives as many ounces as the number of years or a little more Say for a boy of ten years one should give roughly either eight to ten ounces per vein, in very urgent cases and say another eight ounces subcutaneously If the symptoms are not very urgent one may give about sixteen ounces subcutaneously and alkaline glucose normal saline about two ounces every three hourly rectally, according to indication

Important practical details All these salines for injection should be properly filtered either through sterile filter papers or filtered while hot or better still through boiled and thus sterilised fine muslin, or through a pad of sterile cotton wool All the articles and the saline should be properly sterilised before transfusion The hands of the doctor, utensils and other instruments as well as the skin of the patient demand surgical asepsis

Calcium in cholera Formerly for the preparation of the hypertonic saline of Rogers, calcium chloride was used But calcium chloride has the disadvantage that it forms a sediment in the presence of sodium bicarbonate But since the introduction of gluconate calcium can be given intramuscularly Not only that, calcium gluconate in ten percent solution, five to ten c cm may be given every four to eight hours, according to indication, separately, either intramuscularly, better still per vein

Calcium is specially indicated besides its routine use, in cases of repeated or prolonged collapse, in pregnant patients, in cases of pink or bloody stools, in cramps, in undue irritability of the nerves in weakness of the heart and lung, in elderly patients etc As it lowers the permeability of all cells and membranes, is of much use in all cases of cholera

Alkalies and Glucose As already mentioned they are of considerable service in the treatment of all cases of cholera They tend to prevent, when started early in the disease, anuria, uremia, and correct the loss of alkali reserve of the system They are invaluable also for the treatment of cholera at its later stages

Bacteriophage in the treatment of Cholera d Herelle (1928)¹¹ claimed that the natural recovery in cholera was due to the development of bacteriophage in the intestines of recovering patients

To be of use not only the bacteriophage treatment should be instituted quite early, but also, the more important factor must be complied

with, namely, that the phage must be polyvalent and properly prepared. There must be included in the cholera phage all the probable types of lytic principles and unless a phage has got those representative properties, it is useless. The average cholera phage hence appears not of much use, except those prepared by persons who know every thing about it.

Bacteriophage is generally given in an alkaline drink. A few grains, say about ten grains of sodium bicarbonate is taken in half a cup of cool water, then the phage ampoule is marked out by the ampoule cutter at both its ends, and one end is broken off. The ampoule is held on the cup with the cut end upwards and the lower marked end is broken off, making the contents run into the cup of cool alkaline water, which the patient is made to drink off. There should not be any oral antiseptic medication during phage treatment. Preferably the phage is given in an empty stomach as far as practicable, no food or medicines being granted an hour preceding or following the dose. It is to be repeated every three to four hours.

From an extensive set of experiments on 1369 cases of cholera in the Campbell Hospital of whom 684 being treated by a specially prepared phage and the remaining 685 serving as controls, Pasricha and others (1936)¹² came to the following conclusions —

1 Phage was, according to them, instrumental in causing a real reduction in the mortality rate of cholera patients, this was more pronounced in those cases who passed agglutinating vibrios in their stool.

2 There was not much effect in cases who passed non agglutinating vibrios or whose stools contained no vibrios at all.

3 Incidence of uræmia was markedly reduced in those cases who received proper phage treatment.

Chatterjee (1937)¹³ also thinks, bacteriophage in cholera, to be useful. It ameliorates vomiting, purging quickly and the number of saline transfusions required, according to him, was lesser as compared with those in controls not treated by phage.

SERUM TREATMENT

Ghose (1935)¹⁴ in the trial of an anticholera serum, prepared by him, by immunising horses against toxins of cholera, got promising results in the treatment. He advocates his serum to be given intra peritoneally well diluted. But Chatterjee (1937)¹⁵ concludes "Dr H N Ghose's serum 25 c cm mixed with 75 c cm of normal saline and given intraperitoneally, was tried in a fair number in our hospital but results were not so satisfactory".

12 Pasricha and others (1936) Ind Med Gaz Feb 1936

13 Chatterjee (1937) Cholera The Antiseptic February p 117

14 Brit Med Jour, 1935 January 12 p 56

15 Chatterjee The Antiseptic, (1937) Feb p 163

The above worker thinks that twenty c cm of Bayer's anticholera serum intravenously is worth a trial

Cramp As already discussed, is extremely painful and agonising. It starts first in the extremities, then appears in the abdominal muscles

Treatment consists in combating the dehydration, the main cause by saline infusion, calcium is of special use in these cases. Warmth and massage with bland oils or mild counter irritants may keep up good blood supply, and thus relieve this very painful symptom of cholera

Collapse due to Cardio vasomotor weakness The main indications are for the stimulation of the heart and the vasomotor system though generally the results are somewhat disappointing

Under these circumstances intravenous salines are as a rule contraindicated, only where urgently needed the subcutaneous route for hyper or isotonic and the rectal route for the hypotonic or isotonic alkaline saline with glucose should be chosen

SOME COMMONLY USED DRUGS FOR THE HEART AND THE VASOMOTOR SYSTEM

Digitalis group Are more or less not of much use

Adrenalin Given orally under the tongue or 3 c cm by intramuscular injection is useful, only a fresh and reliable preparation is a good vasomotor stimulant and helps sometimes in the subsequent flow of the urine. It is generally effective, may be repeated and it dilates the coronary vessels of the heart besides raising the blood pressure, but the action is very transitory. In urgent cases of sudden collapse about half a c cm may be given per vein in saline

Pituitrin It is of lasting effect and a good diuretic. It should not be repeated before eight to twelve hours, useful also in bad cases of tympanites. It is generally given in half to one c cm doses subcutaneously every eight to twelve hours

Caffeine Sodium Benzoate, in two to five grains intramuscularly every four to eight hours is a good diuretic cardiac stimulant, and coronary dilator. For diuretic purposes it should be given after the other defects such as altered crystalloid and colloid content of blood dehydration etc have been properly attended to

Camphor Groups Such as solu camphire, camphor in ether or oil cardiazol, cardiazol ephedrine etc are useful, but one should remember the irritant effect of camphor on the kidneys. In practice one has used them even in cases of anuria of cholera, without any deleterious effects. But camphor in the free state should preferably not be used. The other derivatives which appear safer, can be repeated every four hourly in bad cases

Cardiazol group may also be given orally Coramine, cyclitone are recent cardiac stimulants

Atropine Sulphate, was used by Rogers subcutaneously in usually $\frac{1}{100}$ to $\frac{1}{200}$ gr for an adult as a routine method morning and evening in all collapsed cases to lessen shock as suggested to him by Lauder Brunton

In practice now it is not given it as a routine One watches the case if there is a tendency in him to keep up a high temperature or tympanites atropine is withheld For hyperpyrexia with weak heart intravenous strophanthin with plenty of glucose, or camphor derivatives cold applications are useful

Atropine and Tympanites For tympanites turpentine stupes or $\frac{1}{150}$ gr of physostigmine and strichnine in $\frac{1}{60}$ gr doses subcutaneously may help the expulsion of the flatus and stool Flatus tubes and turpentine stupes should always be tried at first for the obstinate tympanites of cholera Pituitrin also is a valuable drug in this condition

In children having cholera and intestinal worms hot water bottles wrapped in towels or thick linen, may be of use to relieve the tympanites

Uses of Atropine Sulphate Generally one gives atropine sulphate in $\frac{1}{100}$ gr to an adult every eight to twelve hours when the patient has a low temperature and no tympanites Specially it is indicated in weak or debilitated or elderly persons who generally show weak heart or any disease of the respiratory system Oedema of the lungs specially calls for atropine treatment Seldom is it required before the first injection of saline

Strichnine It is of special service in respiratory involvement and as a general stimulant in asthenia weakness etc

Mechanical devices for the cardio vasomotor weakness

Raising of the foot end of the bed In children and in debilitated persons where there is risk of circulatory insufficiency of the brain, this simple device may do good

In weak heart or oedema lung the patient may have to be turned from side to side to prevent hypostatic congestion of the lungs

Electric bath This may be given in cases where available, and is of service in collapse with cold body and subnormal temperature Generally the duration should be from ten minutes to several hours according to indication It is also useful in lung complications and kidney troubles of cholera

Hot water bottles They are generally used almost in the same conditions as an electric bath, where the latter is not available They

are of considerable service in cases during the winter and in persons with a low or subnormal temperature.

ANURIA AND UREMIA

Anuria It is quite common and may be accepted as a symptom of cholera. It demands the same, but somewhat milder treatment than that of uremia. As the causes of both anuria and uremia are identical, they are not discussed separately.

UREMIA

Some of the commoner Signs and Symptoms Dry coated tongue, anuria, congested eyes, irritability of temper, apathy and listlessness, characteristic sighing respiration, coma or convulsion tendency to be boisterous, he may leave the bed, hence it is not safe for the patient to be left alone.

Causes

The raised specific gravity and altered crystalloid and colloid content of blood This can be treated by infusion of proper quantity and quality of saline, specially alkaline saline with glucose is indicated.

Raised non protein nitrogen content of blood In 1930¹⁶ it was shown by us that practically in all cases of cholera there was raised non protein nitrogen content of the blood specially at the later stages. Patients showing a very high rise of this constituent of blood had a proportionally higher death rate. Injection of saline alkalies and glucose, also eliminatory and other useful methods of treatment are of service.

It is this rise of non protein nitrogen content in cholera that prompted us not only to use castor oil freely, but also to try small doses of sodium and magnesium sulphate¹⁷ in post choleric uremia with somewhat promising results.

Toxic action on the kidneys This action is considerable in cases of virulent infection by vibro cholerae. It to a certain extent is counteracted by the automatic purging and vomiting which helps by eliminating the toxins.

Too low blood pressure

Delay in starting treatment, while in collapse These deprive the kidneys of their optimum blood pressure, and the longer the delay in starting treatment the worse is the outlook. It is for this reason mainly that one advocates saline transfusions before collapse leading to a failure of the proper circulation of the kidneys sets in.

16 Dhar and Idbyee (1930) Role of non protein nitrogen etc Cal Med Jour

17 Dhar (1932) Outlines of the principles of rational treatment of cholera etc Jour of the Ind Med Assn

When this is due to too low a blood pressure originating from cardiovomotor weakness, proper stimulation is indicated

Loss of alkali reserve This point has already been discussed It is best combated by alkalies, glucose and saline Alkalies, orally wherever the patient can retain them add materially to the efficacy of the treatment An alkaline stimulant diuretic mixture is always of use in all cases of cholera, specially when the vomits are not so troublesome and frequent

Glucose, sodium bicarbonate in one percent saline, in liberal amounts taken in sips per mouth are of service in this direction

One should also remember that there may be alkalosis

TREATMENT BY ELIMINATION IN UREMIA

To promote kidney secretion

(i) For this purpose one should do the following Cover the loins that is kidney regions by a binder, thus prevent local chilling This is useful to combat damage caused by local cold Counter irritants and dry cupping over the kidney regions may be helpful

(ii) An alkaline diuretic and stimulant mixture, like the following, every three to four hours may help

Potassium Citrate	gr 30
Spt Ammon Aromat	m 15
Liquor Ammon Acetatis	m 120
Spt Chloroform	m 10
Syrup Aurenti	m 60
Aqua Cinamomi	ad fl oz one

(iii) Diuretin in four to ten grain doses, every eight to twelve hours given orally, may be useful Caffeine sodium benzoate is also of similar use

(iv) Intravenous glucose twenty five to fifty percent, twenty five to hundred c cm repeated according indication, may help to establish the flow of the urine

(v) Intravenous injection of sodium bicarbonate solution is of service It may be repeated according to requirement, one of the best guides being the reaction of the urine

(vi) Liberal use of alkaline saline with glucose, orally and rectally is helpful

Amount of Urine is important One of the best guides in the prognosis, in cholera, is the amount and not the frequency of the urine The quantity of urine should always be measured in the presence of the doctor A free flow generally means that the patient is more or less out of danger, provided other complications or untoward symptoms are absent

Bowels They should not be allowed to be locked unless there is free secretion, say forty to fifty ounces, of urine daily. A case with coated dry tongue and not very alert mental state, with scanty urinary secretion and locked bowels, may pass into the uremic stage in a few hours, hence the importance of keeping the bowels open by either castor oil or by mild saline purges. The latter are of special use in bad cases of uremia, inspite of their slight dehydrating effect even when exhibited in dilute solutions. Dehydration can be controlled more or less successfully, but post choleraic uremia is a thorny subject specially following bad cases from the stand point of satisfactory treatment. Hence one should be more particular about the beneficial eliminating effect of mild saline purgatives and be not so mindful about the slight dehydration resulting therefrom.

TREATMENT OF SOME OF THE COMMONER COMPLICATIONS

Sepsis and Cellulitis They do occur, unless very scrupulous asepsis is observed in giving the saline injections.

They should be treated locally as well as by the injection of anti septic, sulphamamide and sera. A mixture containing small doses of quinine, and adequate amounts of iron, strichnine, and mild purges may serve the purpose of a useful tonic. Bathing the parts in, or compress with, saturated solution of magnesium sulphate may be of distinct service. Formerly electrolytic chlorine bath was given with some success. For the details special books should be consulted.

Bronchopneumonia, Oedema lung etc

They should be treated on the usual lines of all bronchopneumonia. The remedies of special service are —

- (a) Calcium
- (b) Glucose
- (c) In bad cases glucose and insulin for the heart
- (d) Atropine sulphate
- (e) Caffeine sodium benzoate
- (f) Other stimulants, according to indication, strichnine, camphor group etc
- (g) Electric baths
- (h) Frequent turning of the patient from side to side

In oedema lung or other lung complications intravenous saline is contraindicated. In these cases subcutaneous, rectal and oral salines should be taken resort to.

Parotitis For treatment one may see this complication occurring in typhoid fever.

Jaundice Bowels should be kept open. Alkaline mixture, sodium salicylate, urotropine orally, as well as per vein, glucose, decholin and others may be of service and should be given according to indication. Cholecystitis demands proper focal, local, and systemic treatment.

Hiccough Should be treated according to the cause. The fault may be in the loss of alkali reserve of the blood or in local irritation or, such other matters. Its causes should be remedied.

Butter milk, or skimmed milk, or peptonised or citrated milk or diluted milk may be given according to the suitability of the case

Decoctions made out of beaten paddy, (Churi or chupitok) with either sugar or lemon juice and salt, may be liked by the patient

Gradually one adds to the diet of the convalescent soft boiled rice with butter milk, then soft rice and simple curries without spices and fats thus reaching gradually and by steps to the normal dietary of that individual

Usual Causes of Death in Cholera

- (a) Virulence of the attack with intense toxæmia and lack of resistance in the patient (b) Lack or undue delay etc in proper treatment (c) Uremia (d) Some of the greater complications (e) Already damaged kidney heart, lung etc (f) Asthenia, sepsis etc (g) To treat habitual opium eaters is difficult

CHAPTER XXXII

BACILLARY DYSENTERY

General Bacillary Dysentery is an acute sub-acute or chronic infectious disease occurring sporadically endemically or in more or less severe and wide spread epidemics caused by the dysentery group of bacilli¹ clinically there are frequency of stools containing blood and mucus toxæmia toraxia and tenesmus Anatomically noted are catarrhal pseudo-membranous and ulcerative lesions of the large intestines specially of the sigmoid colon and rarely extending upto the lower portion of the small intestine It varies in severity from mild attacks to fulminant gangrenous types

Diagnosis Early recognition of the disease is of such importance for effective treatment that it is quite justifiable to institute serum therapy on the basis of provisional clinical diagnosis, before it is confirmed bacteriologically

During an epidemic the diagnosis is usually not difficult The typical onset with fever toxæmia pain and tenesmus together with frequent stools containing blood and mucous tenderness over the sigmoid colon are sufficient to provide a diagnosis to be confirmed later by bacteriological methods Leukocytosis of blood is common Macroscopically the stool is fluid mixed with mucus and is of red colour gradually turning to the mixture mainly of blood and white semi opaque mucous and practically no faecal matter

Microscopically there is a massive leukocytic exudate consisting mostly of degenerated polymorphonuclears (neutrophiles), red blood corpuscles macrophage cells more or less degenerated plasma cells and white blood cells which may have been almost completely degenerated

But final diagnosis has got to be made by cultural and serological tests The shiga type non mannite fermenters produce more severe toxic symptoms than is done by the mannite fermenting flexner group of bacilli

Differential Diagnosis has got to be made from entamebic dysentery, intussusception and other forms of dysentery, cancer rectum, tuberculosis of the intestines cholera and others

Complications commonly are arthritis uritis, conjunctivitis endoœctitis tachycardia peripheral neuritis peritonitis etc The joint fluid is as a rule sterile

TREATMENT

Prophylaxis This is based on the methods of infection The same measures, as are adopted to prevent the spread of typhoid fever should be undertaken The patient should be isolated, all secretions and excretions disinfected Other precautions for all infective diseases of the bowels should be observed

¹ Perry and Bensted, (1929) Trans Roy Soc Trop Med and Hyg April 25, 1929 p 511

Prophylactic Vaccination. This appears to be of some value,^{2,3} but as yet no universally applicable method has been evolved out

General. As regards absolute rest, choice of the room, nursing, bed, disinfection of the stool etc., the same measures as are adopted in cases of typhoid fever should be taken. But in acute bacillary dysentery, the patient may feel urgency for stool even on slightest movement such as turning from side to side, hence the importance of absolute rest in bed, without any movement. The body should be kept clean after each stool, which must always be passed in a bed pan and in lying position. Flies should not be allowed to sit on the excreta but be disinfected as soon as possible. The linen garments, bed clothes require proper disinfection. The skin round the buttocks, must need be kept dry by properly powdering after application of methylated spirit. Chilling of the abdomen is detrimental, and is best avoided by keeping the belly constantly covered either by thick linen flannel or some suitable clothing, wrapped round and fixed on the abdomen by safety pins.

Diet etc. This should preferably be liquids. The workers in the Tropical school of Medicine, Calcutta, urge that in cases of shiga infection, who show more acute signs and symptoms, arrow root or barley water, sago, glucose, rice gruel or in other words a carbohydrate diet is indicated, whereas in flexner type of infection, less starch and more of protein diet, such as milk and its preparations whey albumin water, soup, egg boiled or poached, minced chicken, milk casein etc., are suitable. Plenty of fluids should always be given because there are real risks of dehydration due to repeated purging.

Bacteriophage. There is no unanimity of opinion about the efficacy of bacteriophage in the treatment of dysentery. Some are against and others are strongly keen on its use. The modern trend of opinion though is appearing to pronounce it as non efficacious,^{4,5} yet one has seen some cases in which it was of undoubted efficacy.⁶ The best dependable phage should be used. Shillong or Tropical School phages are good. One ampoule generally of two or three c.c.m. in a little alkaline water, every three to four hourly, during the acute stage is the usual dosage. But the difficulty with phage treatment is that other forms of medication, specially by oral route has got to be suspended. It should be started early in the disease and if no good result follows after treatment of a day or two, better be replaced by other methods of therapy.

2 Corner (1933) Linneet n p 1162

3 Pergher and Van Reij (1933) Bull Soc de Path exotique 26 No 1 p 46

4 McCay (1931) S Africn Med Jour 8 Octo 18 p 721

5 Manson-Bahr, (1937) Medical Annual 1937 p 129

6 Choudhury and Morison, (1929) Ind Med Gaz Feb p 66

Saline Purges This old form of treatment which has stood the test of time, is to me, of considerable use. In an acute case of dysentery it is generally given in something like the following prescription

Pot Citrate	gr	20
Magnesium Sulphate	gr	10 to 30
Sodium Sulphate	gr	10 to 30
Tr Hycoscamus	m	15
Syrup Aureuti	m	60
Glucose	m	60
Aqua Chloroformi	ad fl oz	1

half to one dose every hourly in bad cases, then every two to three hours and so on. As the symptoms improve the mixture should be given less frequently. But it may have to be given twice a day even when the symptoms have disappeared in order to prevent constipation and to avoid chronicity. If there is much griping and pain, about three to five drops of tincture opii camphorata may be added per dose of the above mixture. This treatment should be continued till the patient improves considerably and the condition of the tongue approaches normal. It may take a few days to a week or more. The sooner this treatment is started the better and quicker is the result. The improvement is effected by removal of the toxic infected material, preventing its absorption and drawing inside the lumen of the gut the defensive juices and cells by processes of osmosis. These relieve congestion and inflammation. In sub-acute and chronic cases of some duration this treatment with saline purgatives, better in large doses, given twice or thrice daily may have to be continued for weeks and even months. Such eliminating rational treatment gives a rapid relief of symptoms and is satisfactory, when initiated early. The larger doses of the purgatives in the above prescription are indicated in the sub acute and chronic conditions.

Some workers like to give a castor oil mixture as is used in cases of amebic dysentery. The effect of this is not so satisfactory as that of saline purgatives.

In order to ensure rest at night these purges may be omitted and replaced by a powder containing one to two grains of Dover's powder every three to four hourly or an injection of 1/6 gr. of morphine with 1/200 gr. of atropine for an adult. This rest is of great use for these exhausted patients. The dose of these sedatives should be reduced proportionally in the case of children who tolerate opium and morphine preparations badly.

Serum Treatment It is very useful in acute febrile and toxic cases of shiga infection. The earlier the serum given the better is the result. It should be given in big doses from forty to hundred c.c.m. by intra-

muscular injection, daily for two three days or more, till the symptoms improve considerably. In very urgent cases with due precautions against anaphylaxis, the serum, well diluted with sterile normal saline, warmed at body temperature, may have to be given intravenously. In cases of Flexner type of infection, serum is not of much use. In every urgent cases it may have to be repeated every twelve to eighteen hours. It (serum) should be of a dependable brand and polyvalent character. Intraperitoneal route may be utilised for administration of serum in young patients.

SYMPOTOMATIC TREATMENT

Tympanites and diarrhoea etc. Kaolin or animal charcoal, either alone or both combined may be used when the purging is exhausting. They both act by adsorbing toxins. Kaolin is given as in cases of cholera. Animal charcoal in dram doses either in capsules or in emulsion, thrice or four times a day may be of use. Ultracarbon or char-kaolin may be useful. Carbon is of use for tympanites and kaolin for purging. For tympanites saline purges, warmth on the abdomen, turpentine stupes may also be effective.

Pain and Distress of the bowels. Normal saline bowel wash of one pint, slightly warmed may be soothing, to this about five to ten drops of tincture of opium may be added, provided the patient is not a child. Astringent enemata such as normal saline with alum ten grains or tannic acid ten to thirty grs per pint may be soothing, specially before the patient retires for the night. The old starch opium enema made up of,—

Tincture opii	m 30
Mucilaginis Amyli ad fl oz 2	

may be used with advantage. But for younger patients the dose of tincture opii should be reduced according to the age, body weight and so on. The lower bowels should be washed first to cleanse the parts so that these medicated enemata may come in intimate contact with the mucosa and exert their astringent action. Uzara (lhq) in twenty to thirty drops thrice daily, cupaco, one tablet every six hourly may be tried notably in griping, colic, pain and diarrhea. Morphine and atropine in proper doses may be the last resort.

Dehydration and Collapse. These demand the same methods of management by saline transfusions and stimulants as in cases of cholera. Atropine injections, warmth locally etc., are of use too. Orally plenty of fluids, glucose drink, alkalies etc., should always be exhibited.

Cardiac Weakness may require the free use of diffusible stimulants like cardiosol, veritol, camphor in oil, or ether, etc. Glucose insulin injections may be required in bad cases.

Oral Vaccine Oral vaccine of the poliomyelitis type given on an empty stomach, twice to four times a day, even during the acute stage, in 10,000 million to 10 billion doses, may be tried.

Apple diet In Germany mellow apples well scraped without any grits or pips in it, are given in one hundred to three hundred grams or thirty to hundred ounces, per meal, five times a day. No other food, except glucose saline, lactose per mouth is granted.

Convalescence As the patient's symptoms improve, according to his digestibility taste and appetite, gradually and cautiously solids should be added to his dietary.

During convalescence constipation should always be avoided, either by such suitable simple agents as "trifolia water" or "Ispaghula" (*Plantago ovata*) or "beal fruit," or "papita" etc., but to be sure one may give either liquid paraffin or some suitable combination, such as petrolagar, angier's emulsion or agarol etc. Soft consistency of the stool is to be ensured to prevent kinking, constriction or other troubles inside the gut. Cascara, saline purges, senna may be also useful for this purpose.

CHRONIC DYSENTERY

TREATMENT —

Chronicity Chronic cases may show various manifestations. Investigation should be made, besides clinical manifestation by 1 repeated examination of stools, 2 culture and agglutination test of the excreta, 3 sigmoidoscopy, 4 barium enemata and skiagram and so on.

A careful regulation of the bowels either by saline purgatives or castor oil once or twice a day, not interfering with the person's daily work is appreciated. An acid mixture after food, of about twenty minims of dilute hydrochloric acid and the rest of glycerinum pepsini upto one dram twice daily after the principal meals, is of service in most cases, as some degree of achlorhydria is common in chronic sufferers. In persons associated with amebic dysentery, proper lines of treatment are to be followed.

Bacteriophage which causes an autolysis of the incriminating organisms may be tried.

Vaccine

A course of *autogenous*, in its absence, stock vaccine generally beginning from twenty to fifty million organisms and incriminating streptococci⁷ combined with oral administration of a powder containing calcium lactate ten grains and extract parathyroid sicum 1/10 grain, three times a day, may be used with some benefit.

Bowel washes and medicated enemata may be of service, specially when sigmoidoscope reveals ulcers situated lower down. Solutions of 0.2 per cent albargin, 0.1 per cent argyrol, 0.1 per cent copper sulphate are of distinct use for these purposes.

Diet Should consist mostly of proteins instead of carbohydrates. Fish, eggs, meat, milk and preparations like curd, butter milk, etc., are suitable. Symptomatic treatment should consist of relief of symptoms as they arise. Lactic acid bacilli, or butter milk or sour milk or curd, "Dalin" may prove useful. Bear fruit, ispaghula, etc are often suitable.

Relapse On the first appearance of any symptoms like griping, pain, diarrhoea, tenesmus, or mucous and blood in the stool with or without fever, saline purgatives should be exhibited twice daily or more frequently, according to the severity of the case. The acuter the disease the greater is the need for more frequent administration of saline purges. According to Hurst and co workers⁸ (1936) serum in massive doses may be useful in these chronic cases also.

Sequelæ, such as chronic dyspepsia, indigestion, weakness, emaciation, nervousness, depression etc demand the lines of treatment chalked out for chronic cases. In these persons as the general systemic exhaustion is shared by glands of internal secretion specially the thyroid, extract thyroid serum, is worth trying in intractable cases, in half to one grain doses twice daily for four days in the week. The patient's general health should be improved by all means. Change to a better and more bracing climate may be of some effect. The tone of the abdominal and intestinal muscles suffer considerably in these chronic cases. Constant strain on the splanchnic nerves, the brain of the sympathetic nervous system, tends to make the most composed of persons nervous and peevish. These demand local as well as systemic measures, notably for the improvement of the general health and resistance of the individual.

CHAPTER XXXIII

AMOEBIASIS

General Description —

' Entamebic dysentery is a wide spread disease of infectious origin caused by invasion of the structures of the large bowel by the Entameba histolytica a specific protozoal organism belonging to the group of Rhizopoda. The clinical course of the disease is marked by a considerable irregularity and inconstancy of symptoms. There is an acute or sub acute phase characterised by frequent, scanty evacuations often containing mucus and blood, by abdominal pain, tenesmus and general bodily depression. This phase is followed by variable periods of latency during which the clinical phenomena remain for the most part in abeyance. Anatomically the most characteristic feature is an undermining of the sub mucosal layer of the large bowel subsequently extension of the ulcerative process takes place into the mucosa and with less frequency, into the muscular and peritoneal coats. Remote infections usually ending in suppuration occur not uncommonly in the liver, spleen and even in the brain the specific organism reaching these organs by way of the blood stream from the original focus of infection in the intestinal tract'¹. Amoebae may travel by the lymphatic channels and also directly to the distal organs like liver, spleen etc.

During the rains the cysts passed in the stools of the carriers are washed into the sources of drinking water and by this means and also by fingers, food formites filth and flies the cysts enter the human alimentary canal and after an incubation period of a few weeks to a few months, the symptoms appear. Though the clinical manifestations are extremely variable yet, they may be classified in brief though on an arbitrary basis

(1) Acute Dysentery —

- (a) Acute primary form
- (b) Acute or subacute relapsing form

(2) Chronic Dysentery —

- (a) Active relapsing type
- (b) Latent type
- (c) Atypical type

(3) Complications such as amoebic hepatitis and hepatic necrosis, localised peritonitis caecal thickening abscess formation haemorrhage, perforation abscess in remote organs such as liver, brain, spleen etc

But mixed infection by bacilli of the dysentery group often make the picture atypical and not uncommonly difficult to diagnose and treat. Recent work tends to show greater frequency of this mixed type of infection than was formerly supposed

1 Simon (1927) Entamebic dysentery, Practice of Medicine, edited by Tice Vol IV p 271

2 Medical Annual, (1937) p 24

Acute onset. In about one half of the cases the onset is acute. Some are really acute from the beginning but others may have existed for some time as latent, mild or moderately severe infections. Ulcerations might have been present before the onset of sudden diarrhoea. Headache, nausea, chill may usher an attack. Soon follows spasms of gripping pain in the intestines followed by frequent loose motions. In a mixed type of infection which is common there may be some fever and variable number, from fifteen to forty or more stools a day. Some leukocytosis is generally present. The pain is intermittent and colic felt over the umbilical region of the abdomen sometimes rectal and vesical tenesmus occurs particularly in mixed types the bacillary infection causing ulceration of the sigmoid and part of the rectum hence the tenesmus etc.

In other forms there are variable groups of symptoms ranging from alternate diarrhoea and constipation early morning diarrhoea symptoms of frank but intermittent dysentery or those of one of the complications may sway the field. Pain and gripping specially during or just before defecation, pain or heaviness in the region of the liver dyspepsia are suggestive and should lead to the examination of the stool. In severe forms gangrene of the large intestines may follow.

Clinically. Besides cases showing more or less obvious and frank manifestations of dysentery there are many others who complain of vague signs and symptoms which unless carefully remembered may lead to errors and over sight.

A sense of discomfort below or above the umbilicus, dyspepsia, unaccountable pain in the abdomen more marked at the time of defecation, liquid stools with or without gripping, slight pyrexia which cannot otherwise be accounted for, heaviness in the hepatic region and so on are very suggestive and should lead to careful scrutiny of the stool following a saline purgative. The stools should be examined immediately after passage specially in the colder months. Not uncommonly one has met with cases of chronic intestinal amoebiasis simulating gastro-duodenal ulcers. Atony of the stomach is also common in such subjects.

Diagnosis. For the purpose of diagnosis the entamoeba should be seen microscopically better living and motile. The stool should be fresh after a saline purge may have to be examined for several consecutive days. Small pieces of mucous are the best materials for such purpose. Soon after passage of a motion the movement of the amoeba ceases and they die then it is not always possible to spot them out. When the stools are fluid considerable number of these organisms may be met with. Not uncommonly apparently healthy solid stool containing a few shreds of tenacious mucous hanging around may show plenty of entamoeba in the vegetative form.³

The cysts are also worthwhile searching for, specially in cases showing obscure signs and symptoms. Acute symptoms are only produced by the vegetative form of the organism. The vegetative entamoeba histolytica has a clear hyaline appearance, there is clear differentiation between endo and ectoplasm, size of 20 to 30 micron, the organism is very motile, there are no other content inside except a few red blood corpuscles. They never contain bacteria etc. The nucleus has the character of the typical histolytica type of central karyosome. The cysts have generally four nuclei and there are masses of glycogen which stain deep brown by iodine. The nuclei are also of the his-

³ Tribedi and De, (1938)

tolvitica type. They are met with more frequently after purgatives are given. The vegetative amoeba has got to be differentiated from Entamoeba coli and others such as Endolimax nana, Iodamoeba, Buetschli, Dientamoeba fragilis etc. Repeated and careful, microscopic examination of the fresh specimens of stool is the best means of diagnosing this infection.

Sigmoidoscopy. Examination by this instrument may be of great assistance in diagnosis in some cases. Cales and Troussard in their series of two hundred cases recognised amoebic lesions in twenty five per cent with the aid of the sigmoidoscope.

Charcot Leyden Crystals are found in from twenty to thirty per cent of amoebic dysentery cases and Thomson considers their presence to be diagnostic of amoebic as opposed to bacillary dysentery⁵. But recently Tripathi and De have not found them to be so frequent.

Skilographic Examination Vallarino⁶ and others (1925) advocate skilogram examination of the large intestines after barium meals and enemata. Mottled appearance of the large gut, according to them, is highly suggestive of the lesions.

Differentiation has got to be made from bacillary dysentery, chronic ulcerative colitis of infective origin, carcinoma of the rectum, intestinal tuberculosis, and diarrhoea associated with other tropical conditions and so on.

Sequelae of amoebic dysentery, are cretaceous atrophy, adhesion linking etc of the gut. There may be improper absorption of food material, leading to liquid copious pale, usually big frothy stool resembling sprue. There may be atrophy of the mucosa of the tongue which looks red and shiny etc. Mortality for the rest of the patient's life specially when left untreated for a long time, is not uncommon. Even after treatment chronicity is the rule than the exception. Some relation of appendicitis as a complication of amebiasis has been recently discussed by Banerjee, Chopra and Roy⁷ (1936).

4 Strong (1925) Amoebic dysentery, Osler's Modern Medicine Vol II
p 269 See and Feiglers

5 Ibid p 270

6 Amer Jour Trop Med., (1925) 5 p 149

7 Ind Med Gaz., (1936) 71 p 603

Differentiation between amoebic and bacillary dysentery

BACILLARY.

AMOEIC.

1 Season.

Cases occur generally in the summer months, where children, sick persons soldiers or others gather and insanitary conditions prevail such as in asylums barracks hospitals foundling homes etc

2 Age

Subjects are generally children young adults though no age is exempt

3 Incubation period.

Incubation period is one to seven days

4 Onset.

Acute onset with toxæmia, fever, quick pulse etc

5 Generally febrile

6 Course.

Course is of a few days or weeks

7 Complications are generally, (a) arthritis (b) conjunctivitis ititis (c) neuritis (d) When chronic malnutrition emaciation, anaemia and polyserositis may result

8 Causes of death, exhaustion, toxæmia etc

9 Local signs are those of generalised tenderness over the whole abdomen but more marked over the sigmoid colon

10 Torsions and tenesmus marked

Any time of the year, but commonly in late rains or summer. Isolated sporadic cases occur generally endemically

Any age commonly adults or young persons

Generally two weeks to three months or more

More commonly subacute or chronic though may be acute

Is a rule afebrile, except in mixed infection or when associated with complications

Generally prolonged.

Hepatitis hepatic necrosis localised peritonitis or peri rectal perirectal, or peritoneal abscesses haemorrhage perforation abscess or dissemination to distal organs like the spleen and brain etc

Exhaustion or superversion of some of the complications like perforation peritonitis etc

Thickening and tenderness over the cecum colon and so on

These not so pronounced

Though various plans have been worked out in giving emetine, yet for an average healthy Indian adult one grain daily till six such are given may stop most of the symptoms. After this course for majority of cases three more one grain daily dose may have to be repeated after a rest period of two to three days without the injections. The first three doses should be given provided no untoward symptoms or extra weakness is complained of by the patient as a result of the six grains given already. Injections given subcutaneously at different sites, or intra muscularly into the buttocks and fomented immediately afterwards give some pain. The brand of emetine used should be of the best type available otherwise there may be intolerable pain following injections. If subcutaneous route proves very painful the injections may have to be given into the buttocks. Immediate fomentation following injections tend to reduce the pain.

As we know well now, that it is extremely difficult to eradicate the amoebic infection once it has passed beyond the acute stage, it appears unjustified to push a powerful drug to the limit of mild toxicity, but this should not be interpreted as recommending sub therapeutic dosage of this useful remedy.

In very acute and urgent symptoms or in amoebic hepatitis half a grain of emetine hydrochloride is to be injected every eight hourly, thus making a total of one and a half grains per day for the first two days then the same dose, once every twelve hours, that is, one grain per day, till six to nine grains of the drug are exhibited. This plan appears more effective in the above types of cases than one daily injection of a grain.

Some workers advocate in these acute cases oral administration of half a grain of emetine hydrochloride coated with shell to be given daily till four to six such are exhibited. This method of treatment appears important to prevent chronicity of this very intractable infection. Powdered ipecacuanha in twenty grains, last thing at night along with three to four drops of tincture opium or ten grains of tannic acid are useful to prevent chronicity. But these oral remedies may cause nausea, vomiting and may be very distressing to the patient. The oral exhibition of emetine or ipecacuanha may be deferred for the next week, following the injections, as their simultaneous use may render the patient very weak.

Intra venous Though emetine injection in half a grain dose well diluted with glucose saline, intravenously, is advocated and has been given by the present writer in hyper acute cases yet it is not free from risk and may be administered only in hospital where the patient can be made to lie down for days and kept under observation while the treatment is progressing, but in private practice this route appears dan-

gerous Even in hospital practice this method has now fallen into disuse

Precautions Though most workers advocate only alkalies in big doses during the whole period of emetine treatment, yet a mixture or powder containing calcium, alkalies and glucose in proper proportions appears to act better, to counteract the injurious effects of the drug

It is to be borne in mind that the toxic and deleterious effects of emetine are made much worse when the patient is ambulant than when he is confined to bed Hence it is of importance to see that the subject lies in bed all the while the injections of emetine are going on, specially when he complains of weakness or palpitation or any such symptom

Recently, Brown⁸ (1933) of the Mayo clinic has recommended an intensive method of emetine treatment His plan consists in giving injections of one grain every eight hourly, that is, three grains on the first day, one grain every twelve hours amounting to a total of two grains on the second day, then one to two grains on the third day Emetine according to him can be given intravenously but subcutaneous⁹ route is quite effective enough, hence it is better not to run the risk of intravenous therapy Three grains per day is certainly a very risky dose for an average Indian patient One and a half gr is the maximum that one has given to our patients of average built

Emetine bismuth iodide group Emetine bismuth iodide in two grains, either in hard gelatin coated capsules or floated in two drams of liquid paraffin, last thing at night, with one sixth grain of omnopon half an hour before each dose, is advocated in relapsing or chronic infections It is to be given for six to twelve consecutive nights This drug tends again to cause nausea, vomiting, and sometimes great distress to the patient This is of particular use in chronic cases

Emetine periodide, in capsules of two grains twice or thrice daily is said to be efficacious in chronic cases after the course of emetine is over, or simultaneously along with it But this also has most of the disadvantages of emetine bismuth iodide

Kurchi bismuth iodide,¹⁰ in eight to ten grains twice daily for a week to ten days, preceded by a dose of alkaline mixture exhibited half an hour before these powders are said to be of use These are sold in tablets under various trade names such as anabin, kurchilnide and so on

Liquid Extract of Kurchi The workers in the school of Tropical

8 Proc Staff meet Mayo Cl., (1933) 8 Nov 22nd p 706

9 Amer Year Book of General Medicine (1931) p 748

10 Aeton and Chopra, (1933) Ind Med Gaz 08 p 6

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⁸ Proc. Staff meet Mayo Cl. (1933) 8, Nov 22nd p 700

⁹ Amer Year Book of General Medicine (1931) p 748

¹⁰ Acton and Chojra, (1933) Ind Med Gaz 68 p 6

Medicine Calcutta, use one to two drams of liquid extract of kurchi, twice daily, with a little water, or combined with two heaped tea spoonful of ispaghula (*Plantago ovata*) soaked in water. The bowels should be kept open by salines during this treatment.

Kurchi (*holarrhena anti dysenterica*) is used in India since the time of Charak (nearly 1000 B.C.) with good results in cases of dysentery. It has the great advantage that it is not much of an irritant to the gastro intestinal tract as ipecac groups are.

In persistent or chronic cases a combined treatment by injections of emetine followed by oral administration of kurchi group of drugs is indicated. Besides these the other amebacides should also be given a thorough trial.

Bismuth subnitrate in heaped teaspoonful doses, suspended in a glass of water or as an emulsion thrice daily, for six weeks in mild, and in half the dose for two to four months, always coupled with alkalies and purgatives in chronic cases, are of use.

Chinioson or Yatren 105, (Sodium iodohydroxy quinoline sulphonate) containing 32% per cent iodine, though advocated by the German¹¹ and other¹² workers in two to three gram oral doses daily divided into one gram each thrice a day, yet such amounts cause too severe gastro intestinal irritation in the majority of patients resulting in pain in the abdomen and severe frequent diarrhoea. Generally seven to ten grms (usually sold in small approximately 1 gr tablets) twice or thrice daily may be of use. This treatment should be given for seven to ten days. It is found useful in chronic or long untreated cases but is rather expensive.

Yatren Enema A two per cent solution of yatren, used in ten to twenty ounces as a bowel wash is of benefit. For this purpose a stout catheter attached to the douche nozzle introduced high up the rectum well lubricated the patient lying on his left side, the buttocks raised by a pillow placed underneath the oil cloth may help in washing the bowels well. The enema warmed at body temperature should be made to retain as long as possible. This is given for a week daily, and repeated according to the result, after a rest period of seven days or so.

Iodoform (Iodochloroxy quinolin) The American workers¹³ report favourably on the proper use of this remedy. It is given in 0.25 gram three to four times a day after food¹⁴ for ten days. The same

11 Menk (1929) Arch f Schiffs und Trop Heig Vol 33

12 Reed and Johnston (1931) Amer Jour of Trp Med 14 No 2 March 1934

13 Dr. W. Johnston and others (1931) Jour Amer Med Assoc May 27th 1931

14 1808

15 Bey, (1934) Jour of the Egyptian Med Assoc October 17 No 10

course is to be repeated in relapsing or intractable cases after a rest period of eight days. It is also, said to be of use in the acute cases.

Enterotoxiform enema, about eight to ten ounces of half to one per cent suspension of this drug warmed at body temperature may be used as an enema in chronic cases as in vatren. It is given for about five days, with a period of rest, and repeated according to the result obtained and other indications.

Carbarsone (Lilly) (*p*-carbamino phenyl arsenic acid Lilly) and ambarson (B C P W) both having similar¹⁵ if not identical formula are being used with success in all forms of amoebiasis specially of the chronic type¹⁶. Since the introduction of this drug the old stovarsol has fallen more or less into disuse. Carbarsone contains nearly 28.85 percent of arsenic.

It is given in 0.25 gram or nearly 3½ grs in gelatin capsules twice daily after food for ten to fifteen days. No alkalies should be given along with this drug. It is efficacious in all forms of intestinal amoebiasis¹⁷. This medicine is rather expensive for poorer patients.

Carbarsone Enema. Enema is made of six ounces of distilled water with half a dram of carbarsone and twenty five grains of sodium bicarbonate. This is given on alternate nights, having cleanly washed the bowels by a cleansing douche previous to this carbarsone enema, two hours after the last meal at night. Some quickly acting hypnotic such as sodium amyntal or diaz, or luminal or ipral calcium in one to two grains given previously so that the patient falls off to sleep soon after the enema is given to facilitate perfect retention and absorption. This has got to be given on five alternate nights. During this treatment by enema the drug (Carmarson) should not be given orally for fear of over dosage. In no other disease one should remember more that "the therapeutic hazard in anti amoebic therapy should not exceed the disease hazard".

LOCAL TREATMENT

Cases with extensive lesions in the colon which do not yield to treatment by emetine and the symptoms of dysentery not very acute are often favourably affected by treatment with irrigation of the large intestines. Their purpose is three fold, flushing out, and cleansing the surface of the lesions as well as destruction of the amoebae. Obviously the results of such treatment is effective when the lesions are lower down and within the reach of enemata. The solutions are allowed to enter slowly by gravity and the catheter passed as high as possible. The amount of fluid injected is between one to two liters. Besides the

15 Chopra Sen and others (1935) Ind Med Gaz 70 6 p 321

16 Chopra Sen and Sen (1931) Ind Med Gaz 68 p 315

17 Idem (1931) Ibid July, 69 p 375

enemata of the substances already mentioned quinine hydrochloride one in thousand to two thousand solution has been used. Some workers have tried a twenty per cent solution of cane sugar to increase the osmosis inside the lumen of the gut and thus exert a harmful influence on these parasites, through the action of the defensive juices and cells of the system.

For other serious symptoms, proper treatment is indicated.

Arsenical preparations Calender (1935)¹⁸ has treated cases with injections of emetine and organic arsenicals combined, with good results. But both these drugs are more or less nerve poisons hence they should better be used separately instead of simultaneously.

Sequelae of chronic amoebiasis are dyspepsia, consciousness of the movements of the gastro intestinal tract, malnutrition, peevishness, pessimism, griping, atony of the gut, notably of stomach, achlorhydria, kinking adhesions, permanent thickening of gut and so on. They demand not only proper treatment but the mother disease, amoebiasis which made these possible need treatment with a view to eradicate it in the lines suggested above. But one should remember that chronic amoebiasis is one of the most difficult things to cure, if cure is at all possible in such a peculiar pathological process.

Diet in chronic amoebiasis Subjects of chronic amoebiasis should be careful in their dietary. Constipation or intestinal irritation are bad for them. Alcohol, hot pungent highly spiced foods are positively harmful and are conducive to hepatitis and hepatic necrosis. Beet fruit, papeta, ispaghula taken daily in some form are good. Plenty of vita-papita, ispaghula taken daily in some form are good. Plenty of vitamins fresh fruit juice etc and a bland non irritating mainly protein diet is good for them. If there is too much exhaustion and anæmia proper lines of therapy are indicated. Dry extract of thyroid in half to two grs thrice daily and dilute hydrochloric acid and pepesin after or before meals may be useful. Takadiastase, lactopeptin, pancreatin suitable amounts may prove useful.

AMOEBIC HEPATIC NECROSIS

This condition generally known as liver abscess is now much less frequent than it was a decade or more back. There is hardly any doubt about the fact that their origin is from intestinal amoebiasis. The parasites are transported generally by the portal blood stream and cause necrosis of the liver, sometimes in multiple minute points resulting by agglomeration into a big necrotic mass. The amoebae may also travel by the lymphatics or directly through the peritoneum to the liver. The abscess is situated in the majority of cases on the right lobe of the organ. Predisposition to this necrosis is brought about by alcohol and is stressed specially by Rogers, Megaw and others. Hot spicy

food as they conduce to cirrhosis of the liver so also may predispose to amoebic hepatic necrosis. It is rather uncommon amongst the females, the ratio being in a group seven males to one female. Generally though the necrosed material is sterile to culture, yet there may occasionally be some bacterial super infection.

The important diagnostic points are a history suggestive of previous intestinal amoebiasis. During the presuppurative stage described by Rogers¹⁹ (1924) there is pain in the liver region a low fever may be remittent or intermittent and a leukocytosis mainly of the large mononuclears. At this stage emetine injection will almost surely abort and cure the condition. Later on if left untreated the fever, which may be overlooked unless carefully noted for usually varying from 99° to 102°F may be of any type. Chill and sweat are generally symptoms of advanced disease and may simulate malaria, tuberculosis etc. Pain though commonly dull and aching may be very sharp. It is not constant and may even be absent. Leukocytosis generally from twelve to twenty thousand with a preponderance of large mono nucleas and rarely of polymorphonuclears clears up common. The conjunctiva look slightly yellow but frank jaundice is rare. Vomits may occur. The skin assumes a peculiar sallow colour which is often characteristic of all liver diseases as of this condition.

Upward enlargement of the upper border of the liver as found out by percussion and may afford an important hint in diagnosis. Pain on pressure may be present. Swelling over the sixth and seventh rib of the right side may help in the diagnosis. Crepitations on auscultation specially on the right side of the chest may be misleading and a diagnosis of pleurisy is made even by the experienced.

Roentgen ray examination of the upper border of the liver shows diminution of mobility or complete immobility of the right upper limit of the diaphragm. This right dome may be raised much more above the left normal side. Localised dense shadow in the liver area may be suggestive.

These abscesses may burst into the neighbouring viscera and thus show an anomalous picture.

TREATMENT

This consists in giving injections of emetine in adequate doses of eight to ten grains²⁰ for an average Indian of about eight stones. They are better given in divided portions, say one half gr either every eight or twelve hours. In over weight people of ten to twelve stones about two grains may have to be given initially in twenty four hours divided in four eight hourly half a grain doses. Orally the other drugs such as kurchi, yatrene, emetine bismuth iodide may be given with advantage. Locally warmth, fomentation, poultices, antiphlogistic may be of use and when coupled with injections of emetine the relief is effective and lasting. These measures along with an alkaline mixture, may abort the pathological process and spare the patient from troubles of the pus to be aspirated out.

19 International Confce on health problems in Tropical America, Boston 1924 p 347

20. Fry, (1921) Ind Med Gaz p 488

Two Glass Test. This is a very rough and ready,¹ but important test, to determine the range of infection in the urethra

In anterior urethritis, only the urine of the first glass is turbid, but when the posterior urethra is also involved, the pus flows back and becomes mixed with the contents in the bladder and the second vesical part of the urine which remains clean in only anterior urethritis, becomes turbid

Chronic Stage Generally this stage is reached by the end of the third month. The time limit is agreed by common consent

Chronic anterior urethritis gives rise to the following —

(1) Urethral discharge (2) Tendency towards acute exacerbations (3) Pain, itching or burning in the urethra (4) Stricture and so on

Chronic Posterior urethritis shows mainly, (1) Urinary symptoms like urethral discharge disturbance and mechanical obstruction to urination (2) Reflex pains and abnormal sensations (3) Sexual disturbance like, spermatorrhoea and so on

Likely Complications of:—

Acute Anterior Urethritis. (a) Abscess of the urethral glands, (b) Inflammation of the erectile tissue, (c) Adenitis etc

Posterior Urethritis. (a) Prostatitis prostatic abscess, (b) Seminal vesiculitis (c) Epididymitis (d) Pyelitis, Pyelonephritis etc

Metastatic bacterial lesion (a) Arthritis², (b) Endocarditis (c) Iritis, (d) Bursitis Tenosynovitis (e) Periostitis, osteitis (f) Myositis, (g) Rarely meningitis etc

Next to a detailed history a careful examination of the patient is essential a two glass test and the condition of the posterior urethra, the prostate, seminal vesicles may have to be known by rectal and other examinations Syphilitic infection or any other systemic disease or infection might have complicated the condition as was shown by Kemp and Show³ (1936) in 26.4 per cent of their series and should be gone into. Besides a thorough examination the following points are useful to confirm the clinical diagnosis

(1) Gram staining of the discharge⁴, but in chronic cases the organisms may not be encountered at all

(2) Suitable cultural methods are useful for the details Leiby and Carpenter⁵ (1936) modification of McLeod's method may be of service

(3) Complement fixation test though does not afford very definite diagnostic proof yet may be a valuable adjunct in establishing the diagnosis⁶

The patient should also be examined as a whole to exclude the possibility of any other systemic disease

1 Frankl, (1937) Dermatol Woch 101 p 121

2 Warren and others, (1936) Jour of Lab and Clin Med 12 p 11

3 Ann di Obstet e Ginecol (1936) June 30 p 511

4 Jour Amer Med Assoc (1937) 109 Octo 30 p 1428

5 Amer Jour Syph Gono and Ven Dis, (1936) July part I 20 p 317

6 Price, (1933). Complement fixation test of Genitourin LCC Publication.

TREATMENT

Abortive The parts should be washed clean with soap and water After urination, the glans and the meatus are cleansed by an antiseptic, such as a strong solution of potassium permanganate, followed by rectified spirit About twenty minimis of one per cent protargol or one in two thousand colloidal silver are injected into the urethra with a dropper or hypodermic syringe The lips of the meatus are held together and sealed by collodian, the penis being kept in the vertical position all the while till the collodian seal dries and gets hardened The patient is then encouraged to drink as much plain water, barley water or any other simple drink he likes After three hours the seal is removed with ether and the patient is allowed to urinate This process is repeated six hours later and continued twice daily for the next two days in case there is no pus as yet A small proportion of cases can thus be aborted It acts according to some probably by either osmosis or some other phenomena, as this is too weak an antiseptic method to disinfect the urethra

In fully developed cases

As soon as the pus appears, the patient should preferably go to bed, as in all acute infections A saline purgative should keep the bowels regulated This diminishes the risk of spread to the posterior urethra All physical exercises particularly riding, cycling, dancing are to be avoided A suspensory bandage may be of use Diet should be of a bland type, and plenty of fluids given Alcohol, tea and coffee should preferably be avoided particularly the first one The urine due to its acid reaction, may cause, pain during micturition This may be avoided by rendering the secretion alkaline by a prescription like the following to which a mild saline purgative is added with advantage

Potassium Citrate	gr 30
Liquor Ammon Acetatis	m 60
T <small>r</small> Bessaronna	m 6
Potassium Bromide	gr 10
Sodium Phosphate	gr 60
Syrup Auranti	m 60
Aqua Chloroformi	ad fl oz one
	one dose thrice daily

Treatment of the urethral discharge

- (1) By chemotherapy, (2) By vaccines and antitoxins, (3) By irrigation

Chemotherapy

Manganese Injection is given of one percent solution of one c cm of manganese butyrate or colloidal manganese, in one c cm

Two Glass Test This is a very rough and ready,¹ but important test, to determine the range of infection in the urethra

In anterior urethritis only the urine of the first glass is turbid but when the posterior urethra is also involved the pus flows back and becomes mixed with the contents in the bladder and the second vesical part of the urine which remains clean in only anterior urethritis becomes turbid

Chronic Stage Generally this stage is reached by the end of the third month The time limit is agreed by common consent

Chronic anterior urethritis gives rise to the following —

(1) Urethral discharge (2) Tendency towards acute exacerbations (3) Pain itching or burning in the urethra (4) Stricture and so on

Chronic Posterior urethritis shows mainly, (1) Urinary symptoms like urethral discharge disturbance and mechanical obstruction to urination (2) Reflex pains and abnormal sensations (3) Sexual disturbance like, sperorrhoea and so on

Likely Complications of —

Acute Anterior Urethritis (a) Abscess of the urethral gland, (b) Inflammation of the erectile tissue (c) Adenitis etc

Posterior Urethritis (a) Prostatitis prostatic abscess (b) Seminal vesiculitis (c) Epididymitis (d) Pyelitis Pyelonephritis etc

Metastatic bacterial lesion (a) Arthritis² (b) Endocarditis (c) Iritis, (d) Bursitis Tenosynovitis (e) Perostitis ostensis (f) Myositis, (g) Rarely meningitis etc

Next to a detailed history a careful examination of the patient is essential a two glass test and the condition of the posterior urethra the prostate seminal vesicles may have to be known by rectal and other examinations Syphilitic infection or any other systemic disease or infection might have complicated the condition as was shown by Kemp and Show³ (1936) in 26·4 per cent of their series and should be gone into Besides a thorough examination the following points are useful to confirm the clinical diagnosis

(1) Gram staining of the discharge⁴, but in chronic cases the organisms may not be encountered at all

(2) Suitable cultural methods are useful for the details Leahy and Carpenters⁵ (1936) modification of McLeods method may be of service

(3) Complement fixation test though does not afford a very definite diagnostic proof yet may be a valuable adjunct in establishing the diagnosis⁶

The patient should also be examined as a whole to exclude the possibility of any other systemic disease

1 Frankl (1937) Dermatol Woch 104 p 121

2 Warren and others, (1936) Jour of Lab and Clin Med 12 p 11

3 Ann de Obstet e Ginecol (1936) June 30 p 811

4 Jour Amer Med Assoc, (1937) 100 Octo 30 p 1122

5 Amer Jour Syph Gono and Ven Dis (1936) July part I 20 p 317

6 Price, (1933) Complement fixation test of Gonorrhoea L.C.C. Publication

tion

TREATMENT

Abortive The parts should be washed clean with soap and water. After urination the glans and the meatus are cleansed by an antiseptic, such as a strong solution of potassium permanganate followed by rectified spirit. About twenty minims of one per cent protargol or one in two thousand colloidal silver are injected into the urethra with a dropper or hypodermic syringe. The lips of the meatus are held together and sealed by collodian, the penis being kept in the vertical position all the while till the collodian seal dries and gets hardened. The patient is then encouraged to drink as much plain water, barley water or any other simple drink he likes. After three hours the seal is removed with ether and the patient is allowed to urinate. This process is repeated six hours later and continued twice daily for the next two days in case there is no pus as yet. A small proportion of cases can thus be aborted. It acts according to some probably by either osmosis or some other phenomena as this is too weak an antiseptic method to disinfect the urethra.

In fully developed cases

As soon as the pus appears the patient should preferably go to bed as in all acute infections. A saline purgative should keep the bowels regulated. This diminishes the risk of spread to the posterior urethra. All physical exercises particularly riding, cycling, dancing are to be avoided. A suspensory bandage may be of use. Diet should be of a bland type and plenty of fluids given. Alcohol, tea and coffee should preferably be avoided particularly the first one. The urine due to its acid reaction, may cause pain during micturition. This may be avoided by rendering the secretion alkaline by a prescription like the following to which a mild saline purgative is added with advantage.

Potassium Citrate	gr 30
Liquor Ammon Acetatis	m 60
Tr. Belladonna	m 5
Potassium Bromide	gr 10
Soda Phosphate	gr 60
Syrup Auranti	m 60
Aqua Chloroformi	ad fl oz one
	one dose thrice daily

Treatment of the urethral discharge

(1) By chemotherapy, (2) By vaccines and antitoxins, (3) By irrigation.

Chemotherapy

Manganese Injection is given of one percent solution of one c cm of manganese butyrate or colloid manganese, in one c cm

intramuscularly. Treatment is better started as soon as pus appears. The next injection is generally given by the fourth to the fifth day. This not uncommonly helps in doing good to some.

Sulphanilamide Group⁷⁻⁹. Recently Cokkinis¹⁰ (1937) has treated two hundred and fifty cases of gonorrhœa at various stages, with gratifying results, by oral administration of sulphanilamide.

For Acute Cases he gave orally two tablets (one each of 7½ gr.) four to five times a day after meals, that is, a total of four to five grams daily after food and followed by a big glass of water. This is the dose for young men of good weight and physical state. Plenty of alkalies in thirty grains each of potassium citrate and sodium bicarbonate three to four times a day is given along with. Patients should avoid articles containing sulphur or sulphates, as these lead to sulphæmoglobinæmia. Eggs, and salines in the form of sulphates are always to be avoided. The blood should be regularly counted and examined as there is risk of agranulocytosis.

The drug should be so spaced as to maintain a constant concentration of it in the blood and the tissues. Major amounts appear to be excreted in about twelve hours' time. Those cases which react favourably do so in two to six days' time. Those proving refractory, to such treatment are not likely to be benefited by this drug, and it appears futile to persist on the treatment by this useful remedy.

Duration and dosage etc of Sulphanilamide treatment. For adults of good height and weight, eight to ten, seven and a half grain or half a gram tablets, a day two at a time after meals, with plenty of water, alkalies and glucose for two to six days according to the effect is adequate. Almost all cases show striking improvement and the discharge ceases and the gonococci disappear from the discharge. For elderly people or undersized persons three grams daily are to be given for the first few days. Most of the average Indians will not require more than three to four grams a day. The next week the dose is reduced to two to three grams a day. Total period of treatment, according to Cokkinis, varies from seventeen to twenty days.

For Gonorrhœa with complications

Cases of Posterior Urethritis or what is more properly a *inguinitis* of the bladder, on the whole react quite well to the above routine, as do most patients with gonococcal arthritis, fibrositis, and eye conditions. But cases of prostatitis and epididymitis have proved

7 Jour Amer Med Assoc., (1937) Report of the Council of Pharmacol
May 29 108 p 1888

8 Dus and Colson (1937) Jour Amer Med Assoc 108 p 1853

9 Crean (1937) Lancet II, p 895

10 Brit Med Jour., (1937) Nov 6 p 902

extremely capricious. Whilst the above technic was effecting remarkable cures in most of the patients, yet in others it was doing little or nothing.

For cases of Chronic Gonorrhœa (Morning gleet, recurring slight discharge etc.) Cokkinis gave three grains of sulphanilamide daily for seven to ten days, and fifteen grains for a similar period with almost uniformly successful results.

For non gonococcal urethritis and prostatitis or cystitis the treatment consists in giving sulphanilamide in above doses only for seven to ten days. In these cases and in chronic gonorrhœa irrigation appears superfluous. But to alkalise the urine is essential.

Tests of Cure. Very rigorous tests of cure were applied in these gonococcal cases.

Toxic Effects. Some of the patients stood this almost toxic doses of sulphanilamide "without turning a hair," whereas in others there were not only agranulocytosis¹¹ due to depression of the haematopoietic functions of the bone marrow, but also rarely optic atrophy¹² have been observed. Annoyance, loss of memory, headache (frontal) persistent vomits, giddiness, ulceration of mouth and throat, rigors, cyanosis, dyspnoea, loss of visual acuity, anorexia, constipation, lassitude and so on mean poisoning and the drug should at once be stopped. In no case the total dose of sulphanilamide should exceed *sixty*, at the most *seventy* grams in the maximum period of twenty one days. There may be urticaria, specially at the wrists. Fortunately these symptoms very rapidly disappear with the withdrawal of the drug. In every case the patient should not only have plenty of water and alkalies but also an abundance of glucose.

In conclusion Cokkinis remarks "An intensive trial with sulphamamide has proved conclusively that we now possess an effective remedy for gonorrhœa and for most of its complications etc."

Uleron (Bayer) a preparation of the sulphanilamide group has been very much advertised. It is said to be of special use in gonorrhœa, and has same methods and details of administration except that the dosage is about half that of sulphanilamide and in most cases a cure is said to follow in three to seven days time. Uleron appears to be an improvement on sulphanilamide in the treatment of gonorrhœa.

My experience about the efficacy of uleron in gonorrhœa is encouraging. But sulphanilamides of other makes appear to have beneficial effect on cases of gonorrhœa.

¹¹ Jennings and Southwell-Sander, (1937) Lancet II, p 898

¹² Bucy, (1937) Jour Amer Med Assoc 109 p 1007

Sera Vaccines etc. Sera and Vaccines are used by various workers with variable results¹³. Autogenous vaccines are preferable, and the primary culture material should better be used for this purpose, otherwise repeated subcultures cause the bacteria to lose the optimum antigenic value.

Stock vaccines are of doubtful efficacy in preventing the complications.

In acute cases generally one to five million organisms are given subcutaneously, preferably intradermally, every three to five days. In chronic states, vaccines may be of some use, and are given in ten to fifty million doses once a week or thereabout. In *arthritis*, during the acute stage, smaller, say upto ten millions, and in chronic cases bigger doses beginning from fifty and gradually increased up to one hundred to three hundred millions or more organisms, at weekly intervals, are advocated. Some workers have used one thousand million organisms with good results. Detoxicated vaccines are advocated in the acute stages and is said to produce good results. In some instances intravenous vaccine injection has been given with some effect. The Corbus Ferry¹⁴ (1936) gonococcus toxin (Gonoderm P.D.) appears useful only in chronic gonorrhœa. But the former reports of treatment by gonoderm were encouraging¹⁵. On the whole vaccine therapy in gonorrhœa, once holding so much expectation has not adequately fulfilled it.

Antitoxin Recently Avery Davis¹⁶ (1937) treated cases of gonorrhœa by antitoxin with good results. One hundred and fifty-seven persons were treated by the antitoxin, prepared in the Park Davis research laboratory, in one to three or more c.c.m. doses given intramuscularly showing good effect. But the efficacy of sulphanilamide group and notably of uleron appears better than that of any other form of treatment. It is also rather cheap and has all the advantages of oral medicated. All American preparations bear scientific name of sulphanilamide and are cheap but efficacious.

Irrigation By the time discharge appears in gonorrhœa, the gonococci have already gone deep into the mucosa, of the urethra, and the antisepsics are usually not strong enough to kill the deeply buried organisms hence washing of the urethra, though often advocated to be the best method of treatment, cannot be accepted now as of such efficacy. But the mechanical washing out of the discharge by irrigation is useful. Too strong chemicals may set-up an urethritis in

¹³ Thomas Ruth Byrne and others (1936) Amer Jour Syph Gen & Ven Dis (Jan Suppl) 29 p 9

¹⁴ Deskin (1936) Jour Amer Med Assoc 107 p 951

¹⁵ Cumming and Burhani (1936) Ibid 105 Janu 10 p 181.

¹⁶ Brit Med Jour, (1937) i p 21

Epididymitis The patient should be put to bed and irrigation stopped. The testes should be supported. Local application of ice or warmth may be of some relief. Intramuscular injection of contramine generally stops the pain and swelling in a short time. Puncture of the gland under anesthesia may hasten recovery. If there is bilateral occlusion sterility may result.

Seminal Vesiculitis It is a complication of prostatitis and often cannot be distinguished from it. The symptoms require almost the same line of management as that of prostatitis. Besides diathermy and massage the rest of the treatment is mainly surgical.

But in all cases of complications ueron or sulphanilamide group of drugs should receive a trial because of their efficacy in gonococcal infection. This has the advantage of simplicity of administration and is cheap.

Cystitis It is dealt with, under the treatment of this condition caused by other infections. Due to the short length of the urethra in the females cystitis is more common in gonorrhœa in them than in the opposite sex.

GONORRHOEA IN THE FEMALE

The risk of gonorrhœa in the female is rather grave and of far reaching importance, due to the extension of the inflammation to the tubes, and thus causing localised peritonitis. It is one of the commonest causes of sterility in women^{21 22}. Some workers are of opinion that about fifty per cent of the female genito urinary troubles, sometimes leading to surgical intervention may be traced to the direct or indirect effect of this infection²³. The symptoms of a dormant infection may get lighted up during menstruation.

The commoner manifestations are —

- (i) Vulvitis inflammation of the Bartholin's glands, proctitis, urethritis, cervicitis endometritis, salpingitis, warts and so on. The line of treatment should be partly in the direction chalked out above. But for the details special treatises on these subjects should be consulted.

Vulvo Vaginitis It is generally an innocent infection which spreads with surprising rapidity due to its extreme contagiousness through infected towels, sponges, thermometers and so on. Specially met with in hospitals, foundling homes, refuges etc. Generally the infection is limited to the vulva less frequently the lower end of the vagina may be affected, rarely the uterine os. Gonococcal urethritis is not uncommon in such subjects.

Treatment of *Vulvo aginitis*, consists in keeping the parts clean by two to five per cent sterile sodium bicarbonate solution, used to remove the adherent secretion. One percent solution of acriflavine douche may be helpful.

Whey, used as a vaginal douche may be of some use. Local application of a paste containing lactic acid bacilli or bacillus bulgaricus is said to be a useful form of treatment. Detoxicated vaccines are said to be of service and should be given weekly, in smaller doses, than those recommended for adults.

Diathermy applied in the vagina and ultraviolet rays on the vulva may do permanent good and should have to be taken resort to in bad intractable cases.

Oestrin Recently oestrin^{24 25 26} injected usually at weekly intervals in 50 000 units of dihydroxy-oestrin seemed to afford good results. The rationale of the treatment is based on the practical work of some investigators that the gonococci are incapable of penetrating the adult vaginal mucosa and oestrin when injected into immature animals, has been found to cause great proliferation of the vaginal epithelium resulting in an adult type of mucous membrane.

Relapses These are very frequent and no case should be declared as cured, unless the patient is kept under observation for three to four months after apparent recovery.

Ophthalmia This requires the time honoured treatment in children born of infected mothers by instillation of two per cent solution of silver nitrate into the eyes shortly after birth (Crede's method). The rest of the treatment should be according to indication.²⁷ One in ten thousand solution of per chloride of mercury to be dropped into the eyes every two hours, so as to irrigate them, and painting of the everted eyelids with a two per cent solution of silver nitrate daily gradually to be changed to weaker applications like five per cent protargol or argyrol, are advocated. Wherever possible an ophthalmic surgeon should always be consulted.

24 Nabarro and Signy, (1935) Brit Med Jour 1, March 16 p 604

25 Phillips, (1935) New Eng Jour Med 213 p 1026

26 Witherpoon, (1935) Amer Jour Obst and Gynecol 20 p 907

27 Caddis, (1930) Brit Jour Ven Dis 12 p 202

COMPLICATIONS DUE TO METASTATIC BACTERIAL LESIONS —

Endocarditis This is often difficult to diagnose. About seventy per cent of cases of endocarditis show involvement of the left side of the heart. It is to be suspected in cases of septicemia by gonococci or where arthritis or a recent instrumentally investigated urethritis is present. Suspicious findings are, persistently quick pulse rate, leukocytosis. A positive blood cultural result is diagnostic.

Sepsis Not uncommonly the signs and symptoms resemble those of enteric fever. For a proper diagnosis blood culture and complement fixation test may be essential. Clinically, a history of an attack of gonorrhoea, irregular fever, leukocytosis instead of leukopenia commonly found in enteric cases, occasionally perspiration, rigor, and suspicious findings in the heart when endocarditis is associated, may suggest the diagnosis.

Treatment Rest in bed, on a fluid diet consisting of fruit juice, milk and its preparations, adequate amounts of all the vitamins specially A, C and D, careful regulation of the bowels, and so on are important measures. Ten c cm of colloidal iodine per vein daily and one c cm of manganese either colloidal or one per cent solution of butyrate intramuscularly once a week may be of some use. Ilectrargol is the favourite of a few enthusiasts. Gonococcus anti serum intravenously in five to twenty c cm doses either diluted with hundred c cm of glucose saline at body temperature, may be of service. This may have to be repeated daily or on alternate days in cases where no untoward symptoms are noticed, and also according to indication. As usual in all these cases the sensitiveness of the patient to foreign serum should be gone into. The death rate may vary from twenty to forty per cent. Sulphamylamide group of drugs are likely to do good here too, and should always be given a trial.

Arthritis The commonly affected joints are knee, ankle, wrist, shoulder, hip, and small bones of the hands and feet. These are mentioned more or less in order of their frequency of affection. It is said that if the temporo mandibular joint is affected, almost surely the case is one of gonococcal origin.

Treatment During the acute stage, rest, warmth, immobility of the parts are essential. Sulphamylamide, contramine, colloidal iodine, manganese have got their advocates. Contramine in 0.25 gm doses though very warmly advocated by a few workers have not been found so useful in the present writer's cases. Potassium iodide may be given when the acute stage is over.

Diathermy applied locally and also for the eradication of the primary focus is of definite value.

The local treatment of joint with effusion consists of application

of liniments, Scott's dressings etc, but the main part of the management is surgical.

Sulphanilamide group is of service and should be given a trial.

Treatment of such complications, as arthralgia, myalgia, fibromyositis, etc, may be very difficult and thus prove taxing to the doctor.

Iodides, contramine, vaccines, toxin of gonococci, such as gono-derm, autovaccines, etc in bigger doses, just to show a reaction, may be of use. Colloidal iodine may raise the basal metabolism and stimulate the thyroid gland to greater activity, thus proving useful as in all exhausting conditions. Milk protein, or casein and vaccine together, may have to be given with some result. Here too the sulphanilamide group should always be given a serious trial.

Fever therapy It was found out that when patients developed high fever due to any cause such as a malarial infection or dengue etc, these states of sub health caused by chronic gonorrhœa improved. This led to the use of pyrotherapy already discussed. But such expensive and advanced appliances are not within the reach of most medical men of our country hence one can try in suitably selected cases an artificial fever therapy by intravenous injection of bacterial proteins. It is safe to start with twenty million of dead typhoid bacilli diluted in five c cm of normal saline intravenously. This should evoke a moderate reaction and basing on this experience one may give fifty, seventy five and hundred million doses respectively, once a week, or every four to five days according to the reaction, state of improvement, tolerance of the patient etc. But any heart disease or valvular lesions, any disease of the kidneys liver or arteriosclerosis in the patient are contra indications to this form of treatment. This principle of fever therapy was introduced by Wagner Jauregg (1918 19)²⁸ for the treatment of general paralysis of insane by induction of malaria artificially.

Other methods of treatment In an adequately equipped electrical clinic various electrical and other methods of treatment are possible. The details of these are not within the scope of the average practitioner hence are not discussed.

CHAPTER XXXV

SYPHILIS

Diagnosis

Clinically, one can diagnose cases of syphilis, provided all the manifestations and their significance are remembered. "Important as are the modern laboratory aids to the diagnosis of syphilis, these should not be permitted to supplant the careful study of the patient himself, for such laboratory aids are by no means infallible and clinical signs of syphilis are still, and probably will always remain of equal or greater importance in its diagnosis¹"

Primary Stage

The primary sore or the Hunterian chancre usually appears, though in three weeks yet cases of infection within ten days of the exposure are recorded. Locally the part is painless and not tender on pressure. Itching may be present or absent. First appearing as a papule the sore gradually becomes brownish red, firm to the touch, turns as a rule into a button like nodule with a shallow concave depression on the surface. The size though variable is usually about one centimeter in diameter, oval or round in outline with a rather hard indurated margin, hence termed hard-sore. Extreme mobility is one of its characteristics. The surface of the sore may be clear, or grayish or covered by diphtheroid membranes. The secretion is scanty and thin. It seldom suppurates, and rarely bleeds. Though the typical primary sore is single yet in one-fourth of the cases it is multiple. Fournier reported a case with twenty-six simultaneous primary lesions. But the dictum of Ricord which was strongly supported by Fournier "Syphilis always commences with a chancre there is no syphilis without chancre,"² is not supported by modern experience, because genuine cases of syphilis are found without an apparent sore.

Lymphadenitis The regional lymph glands specially those draining the dorsum of the penis enlarge and feel shotty, not infrequently secondary infection of the chancre leads to buboes. In short the glands are discrete, hard, not tender on pressure and seldom suppurate. In rare cases those at the groin may not show any appreciable enlargement.

So in the primary stage the clinical data helping diagnosis are history of exposure, if admitted, after incubation period, the appearance, colour, indolent nature of the primary sore, hardness of its margins, surroundings infiltrated comparative painlessness, mobility, little tendency to bleed, gradual enlargement and shotty feel of the groin glands and so on.

Microscopically. The typical spirochetes seen under dark field illumination, in the clear serum oozing out from the sore, after it is cleansed, are diagnostic.

Secondary stage.

The organisms get generalised mostly through the lymphatic system, and the lymph glands enlarge all over the body. Rashes appear in about three to four weeks after the appearance of the sore. They may be of any conceivable

1 Osler's Modern Medicine, (1925) Vol II, Syphilis, p 437.

2 Leonard, (1935) Jour Med deBordeux, 112 p 433

type such as macular papular, pustular, morbilliform serpiginous and so on. The rash first appears usually on the sides of the trunk. Generally there is associated some constitutional symptoms like headache worse in the evening, weakness, loss of strength, anxiety state, fever, adenitis and others. Syphilophobia may dominate the clinical picture in some cases. Some of the cutaneous and mucous lesions are characteristic and constant manifestations of secondary syphilis. Ulcerated syphilitides condyloma, snail track ulcers in the palite or buccal mucosa, alopecia, pigmented syphilitides, mucous patches are highly suggestive. Late secondaries like iritis, tongue changes may be helpful manifestations in the diagnosis.

Tertiary Stage Though there are certain favourite sites to be picked up at the later stages yet no organ or structure of the body is immune from the effects of this disease. Any indolent swelling³ which takes some time to break down from its centre and is unduly slow to heal up, any slowly healing suspicious ulcer having a brownish, greyish, blackish margin should lead to further search and the Wassermann reaction of the blood tested. The commoner sites for nodular granulomata are iliac crests, shoulder blades, palms of the hands, nose, forehead, flexor surfaces of joints and other places.

Amongst bones the sterno-clavicular joint is liable to be affected most notably in acquired syphilis. Tibia, sternum and other bony parts exposed to injury or blows are more likely to show these manifestations. Gummata in the liver may show umbilicated nodular swellings or scars on that organ but the nutrition of the patient may be fair or even good, seldom showing ascites or jaundice. Therapeutic test by the administration of potassium iodide and others, serological test (W R) may clinch the clinical diagnosis.

Some suggestive manifestations

These are aortic incompetence without involvement of the mitral valve and no history of rheumatic fever, cardiac pain, dilatation of the heart or the aorta without any apparent cause, slow growing swellings⁴ anywhere which is difficult to cure by average treatment, thrombosis of the cerebral vessels in adults or persons of middle age or older, any gummata, ulcers very slow to heal. Suspicious growths on the tongue should not only lead to further clinical examination but also the specific serological and subsequent proper therapeutic tests applied.

A few points on the diagnosis of Congenital Syphilis⁵

History of repeated miscarriage in the mother at first during the early months and later as the effect of the disease wanes away still birth, hydranencephalus and so on are suggestive. Later on a living but little old man like child subsequently to be a victim of one of the various types of rashes, asymmetry of the skull, large frontal bosses, flattened nose, vaulted high arched palate, rarely microcephaly may point to the diagnosis. Developmental defects like partially developed heart valves, testes, breast, ovaries, congenital hernia may not be rare. The commoner characteristics namely Hutchinson's triad⁶ consisting of the typical peg-like permanent upper central incisor teeth, keratitis and deafness and clutton's joint are said to be diagnostic. The typical appearance (Trousseau) of the child consists of a yellow skin, scanty hair or bald head, absent eye lashes. But the well known little old man may not be typically present.

3 Four Amer Med Assoc (1937) 108 p 2254

4 Black (1937) Brit Med Jour 1 p 1313

5 Nixon (1934) Clinical Journal 63 p 39

6 Klauder and Robertson (1931) Jour Amer Med Assoc 103 p 236

Snuffles etc Snuffle is the coryza resulting from syphilitic granuloma of the nasal mucosa. There may be ethmoiditis and similar other changes. The serous discharge sometimes contains blood. Bits of necrosed tissue may come out. Nutritional disturbances, fissures at the angle of the mouth, rhagades and so on are not uncommon. Development of interstitial keratitis several years after birth may be an important evidence of congenital syphilis.

Laboratory aids to diagnosis

(1) The finding of the spirochaetes is diagnostic

(2) The Wassermann reaction⁷ when found positive coupled with suspicious clinical findings, have diagnostic value. But rarely positive or doubtful serological reactions are got during active infection caused by malignant tertian malaria, rads leprosy, relapsing fever, diabetes mellitus and lobar pneumonia. There are numerous others such as Kahn's⁸ test, Leuton test of Noguchi and so on. But the Wassermann and the Kahn's are the main standard tests found positive in syphilitic infection.

TREATMENT

PROPHYLAXIS

Syphilis is one of the most wide spread of venereal diseases, and, such very effective preventive measures like, regular medical examination of public women, improving the pay of women of the working class, education of the public, segregation of the infected, and so on which are done in more advanced countries are naturally beyond the scope of the present work. Continence for the individuals should really be the main stay in keeping off the risks, though this is not always practicable for every one.

Congenital transmission is best prevented by timely and thorough treatment of the parents. It is gratifying to find that adequate treatment of the mother notably before conception, produces perfectly healthy babies.

Prophylactic mercurialunction There is experimental evidence in support of the fact, that shortly after exposure, if an ointment like the following is anointed well, the infection may be prevented. But still better would be to steep the parts in one in two thousand solution of hydrarg perchloride, for a few minutes, then rub and smear well the undermentioned ointment on the parts.

Hydrag Subchloride	gr 180
Lanolin	gr 240
White Vaselin	ad oz 1

Accidental or innocent infection This should be carefully avoided by preventing contact with actively infected persons, in the stage of systemic spirochaetemia.

7 Hazen Sanford Paran and others, (1936) Ven Dis Inform, 17 p 203

8 Davies (1937) Ibid 18 p 187

9 Cluver (1937) Brit Med Jour 1 p 1120

10 Pinnery, (1937) Jour of Social Hvg 13 p 105

CURATIVE TREATMENT

Preliminary systemic examination. Before actually starting treatment the patient should be examined thoroughly and carefully, and his urine and blood fully investigated. This is important in view of the fact that as the treatment has got to be pretty long in duration, if the dictates of science are to be followed so the importance in beginning on a system about which some details at least are known. An already damaged kidney or heart means cautious therapeutic regime and these can only be found out by careful physical examination of the patient before the treatment is begun.

Excision of the ulcer. Almost simultaneously with the appearance of the primary sore the spirochetes have crept up the lymphatics to the regional glands, so the excision of the chancre has practically been abandoned.

During the early primary stage the finding of the spirochetes in the clear serum is the best method of diagnosis, as the Wassermann reaction is not likely to be positive unless the systemic dissemination, causing some tissue reaction is there. But one should not forget that a thorough treatment during this stage affords the greatest chance of a complete cure.

Locally. The parts should be kept clean by dusting a powder containing equal parts of calomel and bismuth oxide. Iodo magra used locally may limit the spread of the sore.

Chemo therapeutic ratio of anti syphilitic drugs¹¹ Before actually undertaking treatment one should better remember the relation between the maximum tolerated dose of a drug to the minimum effective dose, this is called chemo therapeutic ratio. For organic arsenical remedies this varies between twenty and thirty to one. Probably there is still greater margin of safety with the new organic arsenical mepharside. In mercurial drugs it is almost two to one and this is why treatment in mercurial preparations may easily lead to poisoning symptoms. Whereas with bismuth the range is quite wide namely fifty to one. So, naturally the safest anti syphilitic is bismuth, next comes organic arsenicals, lastly the mercurials with very narrow margin between the effective and the tolerated therapeutic dose of the remedy.

Re lapse inspite of treatment. During the first one year and a half of infection, syphilis has a tendency to relapse inspite of moderate treatment this is all the more reason why a more or less continuous intensive course of medication for seventy weeks is recommended by the American workers¹².

¹¹ Cole (1936) Jour Amer Med Assoc Dec 26th p 2124

¹² Stokes and others (1933) Jour Amer Med Assoc 21st April p 1261

Organic Arsenicals These preparations of the arsenobenzol group are very effective and often striking in their amelioration of signs and symptoms of this disease. But to depend exclusively on them for a thorough cure appears somewhat unsafe as cases so treated at the early stage of the disease have come with aneurysm and other late manifestations caused undoubtedly by syphilis. The older 606 or salvarsan group is seldom used now a days, but the more soluble 914 or the neosalvarsan group of drugs are used somewhat extensively. These yellow powders containing about eighteen to twenty two per cent of arsenic, are easily changed on exposure to air. So they have got to be injected shortly after the solution is made. The therapeutic efficacy of these neosalvarsan group of drugs is said to be lesser than that of the older salvarsan group.

The commonly used preparations are neosalvarsan, novarsenobil ion, sulphostab, sulfarsenol, and numerous others. These powders are dissolved in five to ten c cm of redistilled water, and injected without any unnecessary delay into the median basilic vein preferably of the left arm. Care should always be taken to see that the needle is inside the vein, as indicated by the inflow of blood during a gentle withdrawal of the piston, while the rubber band, making the vein prominent is still kept tied on. Once the needle is definitely in the vein the rubber band is relaxed and the contents of the syringe pushed into the vein gently and cautiously, watching for any possible untoward symptom. The contents of any cracked or broken ampoule is always to be discarded and condemned.

Dosage frequency method of administration etc

Some careful observers suggest that the first four doses of these remedies should not exceed 0.3 g, because most cases of poisoning or sensitiveness occur during these early injections and if the dosage is larger the untoward results become graver than when smaller doses are used, hence the caution.

The average subsequent doses for women and thin persons is 0.3 to 0.6 g and for men 0.4 to 0.75 g or rarely 0.9 g. Usually one injection is given per week till about four to six grams in women and thin persons, and about six to seven grams in men are reached in total. As in the treatment of Kala azar so also here, it is the total amount of salt in grams and not the number of injections which is the important point to be taken into account. Better results are obtained when these injections are alternated with intramuscular injections of some preparation of bisinuth, than when these arsenobenzol group of drugs are given alone.

Intramuscular injections Medicines given intravenously are more quickly excreted than when they are given intramuscularly. Most ⁹ ₁₀ ¹⁰ _{Pinn} agree that intramuscular injection of sulfarsenol gives more

lasting effect than when it is given per vein. Personally I prefer intra muscular route of injection to the intravenous medication. It is more effective but less risky. Sulfarsenol is very suitably given into the muscles of the buttock.

Solusal arseni. It is a ten per cent solution of an organic arsenical preparation. The doses are one, two, three, four or more c cm respectively. The makers (Bayer) advocate injections twice a week. This drug has produced, in my hands and in the hands of my friends, symptoms of severe poisoning including skin lesions of various types, grades and even hemorrhagic encephalitis in two cases. Personally I think it is rather unsafe for use particularly in the dosage and frequency advocated by the makers. Injections when given, as advocated by the manufacturers twice a week, poisoning symptoms are not unlikely to follow.

Mapharside (P.D.) This is a very recently introduced organic arsenical having the chemical name meta amino-para hydroxy phenylarsine oxide. Peterson (1937)^{13 14} gave eighteen hundred injections in 99 patients and says that a full dose 0.06 g will sterilise a surface lesion of syphilis in twenty four hours. He considers mapharside to be a distinct improvement over both old and new arsphenamine group of drugs. Over the old arsphenamines mapharside as found to have the following advantages —(a) A lower arsenical content, the average dosage being about one tenth that of the old arsphenamines. (b) Insolvent dermatitis and damage to the liver and kidneys are practically unknown. (c) Less of disagreeable taste and smell. (d) Better tolerance. (e) Less of local discomfort even if the solution extravasates into the tissues.

The untoward symptoms like nitritoid crises, and severe reactions following other arsphenamines are rare after its use. Gastro intestinal disturbances are however not very uncommon.

How to use it. The patient should not take any heavy meals three hours before and two hours following the injections. This drug is always to be dissolved at least in ten c cm of aqua distillata and given intravenously but quickly. The syringe rendered suitably sterile contains ten c cm of redistilled water, about one and a half c cm of it are pushed into the ampoule of mapharside whose neck is already broken there is effervescence, as soon as the solution looks clear it is drawn into the syringe with an air bubble, the solution is shaken several times so that any of the gas (CO₂) to be formed mixes with the air after the latter has been expelled the clear solution is ready for injection. While injecting the most important point is to push the whole ten c cm of the solution into the vein in thirty seconds or

¹³ Canad Med Assoc Jour (1937) 36 p 172

¹⁴ Wieder and coworkers (1937), Arch of Dermatol and Syph 15 p 402

quicker. The patient should be instructed to raise up his injected hand and preferably the veins are emptied by massaging from periphery towards the heart, so that any traces of irritant solution remaining in the vein may not produce pain along its course. If slowly injected, the vein becomes very painful.

Dosage, plan of treatment etc. The doses in which it is supplied are 0.03, 0.04, 0.06 gram. The initial one should always be 0.03 g, and the maximum one better remain 0.04 g for women and 0.06 g for men. There are two plans of treatment advocated.

First method. Eight weekly injections of mapharside followed by eight injections of mercury bismuth once every week as the chemotherapeutic ratio of the latter is wider. This combined method is carried out for forty weeks without a rest period, the patient receiving twenty four injections of mapharside, consisting of three courses eight injections per course and two courses of bismuth, eight injections per group, making a total of sixteen injections of the latter. The remaining twelve weeks of the year the patient receives bismuth's once a week.

The Second method. This method consists of one injection each of mapharside and bismuth per week, for fifteen weeks. Two weeks rest, then the above course is repeated, again three weeks rest, followed by another course. This makes a total of forty five injections each of bismuth and mapharside.

Precautions before injection of these arsphenamines

While actually giving these preparations notably intravenously, one should not exceed 0.3 g of the neoarsphenamine group and 0.03 g of mapharside. First four doses of intravenous medication should always be limited to the above dosage.

As a precautionary measure one may give a powder like the following one to be taken thrice daily, the day preceding, on the day and the day following the injection of these arsenicals:

Calcium gluconate or lactate	gr	10
Sodium bicarbonate	gr	20
Glucose	ad gr	60

The patient should not take any solid food three hours before and two hours after the injection. He may be allowed to take one glass of glucose or sugar solution with lemon juice one to two hours before the medication. This and the remedies given in above prescription protect the liver from damage.

are given *enemas*. These remedies are more or less contraindicated.

Intramuscular injection — aortitis, with or without incompetence, quickly excreted than when they

9th others agree that intramuscular injell & p 20°

10 Penn

nephritis, cirrhosis of the liver, extreme weakness, low blood pressure, previous eye or ear troubles and any bad skin disease which may get worse following these injections.

*Some commoner difficulties in arsenical treatment*¹⁶ Nitritoid crisis shows symptoms of vasomotor atony, like those produced by the administration of amyl nitrite and is best treated by the injection of adrenalin one c.c.m., better adrenalin and ephedrine combined. Twenty to thirty drops of spirit ammon aromat in a little water, given five minutes before these injections may prevent it. If the injections are given very slowly this may also be averted.

Jansch Herxheimer reaction There is temporary aggravation of the symptoms and signs shortly after the injection, notably those of the cutaneous system. This tends to pass off in a few days without any treatment.

Skin rashes and dermatitis These may vary from simple or evanescent mild rashes to the most severe exfoliative dermatitis. These severe types of rashes appear to be more common now a days, than they were previously. Solu salvarsan when used for intensive treatment of syphilis these rashes of the serious type are more commonly encountered. In many of these cases the arsenicals have been pushed at shorter interval than once a week, or there might have been idiosyncrasy, or the particular lot of the preparation might have been unduly toxic. But cases of acute dermatitis have been noted to follow without any apparent cause or premonitory signs and symptoms.

Treatment of rashes following arsenicals Intravenous injection of half to one gram of sodium better calcium thiosulphate in ten to twenty c.c.m. of concentrated glucose solution twice daily for the first three to six days, subsequently once a day, and less frequently later on, helps by promoting excretion and neutralising the heavy metals in the system. Plenty of fluid orally may be useful also by helping excretion. Purgatives like magnesium sulphate also act in the same way. Potassium iodide in three to five grains is recommended by some. Contra mine 0.25 g intramuscularly every third to fifth day may be of use. Local application of lotio calamine, olive oil, better sterile codliver oil, is soothing. These oils may suitably be applied on lintsoaked in them.

Jaundice It may be present as a symptom of syphilis, but bigger doses of the neo arsphenamine may precipitate jaundice causing damage to the liver. This latter type of jaundice generally appears in about two to four months after the course of arsphenamine treatment, and hence their correlative significance is often overlooked.

Treatment of Poisoning Treatment consists in promotion of

excretion injections of contramine and thiosulphate as in cases of dermatitis. In all cases of intensive treatment by neoarsphenamine group it is better that one injection of contramine is given in the middle and another at the end of the course of treatment by arsenicals. It appears to prevent poisoning and damage of the liver. During the whole period of neo arsphenamine treatment, orally big doses of glucose alkalies and calcium, which are liver protectors should be given regularly as in other forms of jaundice.

The *itching* may be relieved by local application of lotio calamine, alkaline carbolic acid solution and so on. Injection of atropine in $\frac{1}{100}$ gr may also relieve it. Rarely there may develop blood dyscrasia and haemorrhagic tendencies, following a course of arsenical remedies hence the blood should always be examined with that point in view. Injections of *extract of liver is of service*¹⁷. If there is any tendency towards agranulocytosis, intramuscular injections of the best agents to stimulate leukocytosis such as pent nucleotide may be of value. Decholin solution in five to ten c cm intravenously with glucose daily for three four days per week may do good.

Hæmorrhagic encephalitis It is a very serious complication and generally appears two to five days after the second injection of neoarsphenamine group. The bigger this dose the worse is likely to be the manifestations. The symptoms are pain in the head, vomiting, convulsions, unconsciousness, coma and so on. Rigidity of the neck may or may not be there. In autopsy, extensive haemorrhages are found in various parts of the brain.

This condition may, to some extent, be avoided by the injection of four smaller initial doses of neoarsphenamine remedies. Treatment consists in injections of thiosulphates and contramine, calcium, alkalies glucose, either orally or by injection. Lumber puncture, if there is rigidity of the neck or positive Kernig's sign, may do good. It should be repeated whenever there is indication.

Lasting effect These neo arsphenamine group of drugs are quite useful in clearing up the apparent signs and symptoms quickly, but unless reinforced and fortified by injections of adequate doses of bismuth or mercury, radical cure of syphilis, is not always possible.

Bismuth The chemotherapeutic ratio of this metal is fifty to one, hence it is rapidly replacing mercury in the treatment of syphilis. Being less toxic it does not produce anaemia and irritation of the kidneys, as is done by the mercurial remedies. It is of particular use in cases where mercury is contraindicated. Bismuth should never be given intravenously because it may cause death¹⁸ even.

¹⁷ Chatterjee (1937) Lecture on Arsenopiran 24th May, 1937 (In the Ind Med Assoc Hall)

¹⁸ Curtis, (1930) Jour Amer Med Assoc 95 p 1588-89

Hanzlik (1929 and 1937)¹⁹ advocates, ten intramuscular injections of two c cm each of a one and a half per cent solution of sodium bismuth tartrate. These injections are given twice a week. Potassium iodide is to be given orally in big doses during the whole course of this treatment. It is favourably reported by the American workers, for the treatment of cardio-vascular syphilis, where organic arsenicals are more or less contraindicated. The lotion in the *Iodobismuthate of quinine* is said to have a greater penetrating power in to the nervous system²⁰, hence is of special use in the treatment of neurosyphilis, coupled with big doses of potassium iodide orally. It is a red coloured thick liquid which has got to be warmed up in a bath in order to make it suitable to be drawn into the syringe²¹. They are given in two to three c cm doses intramuscularly into the upper and outer quadrant of the buttock once or twice a week. Bisquinol, iodobismuthate of quinine besides numerous others are two of the important preparations of this type.

Bismuth salicylate and bismuth oxychloride are also used. But these preparations when given intramuscularly cause much pain, hence are not much in vogue.

The recent tendency is to use a suspension of metallic bismuth powder in five per cent glucose solution. The dose is generally two to three c cm intramuscularly into the gluteus muscle once a week or half the above dose twice a week. The amount of metal given varies between 0.3 to 0.4 g or about four to six grains per dose, per week. A total amount of three to four grams of the metal should be spread over three months. Because if given more frequently or in shorter period of time there may appear symptoms of poisoning by bismuth.

Effects of bismuth therapy. Its therapeutic value is more lasting but less rapidly efficacious than that of neoarsphenamine group. It is better than mercury. "Neoarsphenamine is more effective and rapid in action in primary syphilis, while in secondary syphilis bismuth and arsenic are about equally valuable, in tertiary syphilis and neurosyphilis, bismuth is superior to arsenic and mercury, and it is also valuable when spirochetes have developed tolerance to these."²² Under bismuth therapy alone spirochetes disappear from the primary or secondary lesions after two injections. Whereas the gummata retrogress after three or four injections. If bismuth is combined with arsenicals the risk of incidence of neurosyphilis decreases. In the treatment of nervous syphilis this combination is the best. Bismostab

19 Hanzlik (1937) Amer Jour Syph Gonorr and Ven Dis 19 p 1

20 Jour Amer Med Assoc, (1936) 1st Feb p 382 New and non-official remedies

21 Thurman (1936) New Eng Jour Med 215 p 215

22 Bruce and Billings Materia Medica and the Repertories (1933) 14th Edition p 168 Cassel and Co.

and hypoloid bismuth metal are two of the many good preparations of metallic bismuth

Dosage and frequency For adults two c cm once a week, ten such or twenty injections of one c cm each, twice a week. For children, over eight years half, four to eight years one third, one to four years one fourth of a c cm per injection. The total dosage should be according to the body weight. The therapeutic value of these preparations depend on total grams of the metal and not on the number of injections. Three to four grains of the metal constitute one course. The next course of injections of bismuth should not be repeated before an interval period of two to three months, as the metal is very slowly excreted. There are some workers who are against the use of bismuth because even weeks after these injections skiagram shows deposits of the metal in the muscles. But this need not be a defect of this therapy as already pointed out, it is slow but somewhat sure in action.

Over dose and toxicity Regular periodic examination of the urine is essential, because stomatitis and albuminuria are not uncommon early signs of mild toxicity. Blue line in the gums, rashes, tremor etc., are not uncommon. Any symptoms of poisoning indicate complete cessation of bismuth therapy.

MERCURY

This was the main stay of the old doctors in the treatment of syphilis. Its chemotherapeutic ratio is about two to one hence the margin of safety in treatment by this drug is naturally very narrow. This is the reason why one should watch carefully for symptoms of poisoning while treating a patient by mercurial derivatives. It is exhibited by injection,unction, fumigation and oral routes. But it is being fast replaced by metallic bismuth and its preparations.

Intramuscular injection Oily suspension of calomel in one grain doses with camphor and creosote to lessen pain, given intramuscularly, into the buttocks, once a week, till six to ten such are given, was in vogue before. This calomel is generally converted into an albuminate of mercury in the muscles and is absorbed very slowly. But rarely cases of poisoning have been noted after its use. Certain soluble preparations are used for intramuscular injection, but they are not only more painful, but also tend to cause poisoning symptoms by quick absorption of the remedy.

Intravenous Oxycyanide of mercury ($Hgdrargyrum oxycyanum$) in one sixth of a grain, in about five c cm of normal saline, given slowly per vein once a week, was advocated, but it also may produce symptoms of poisoning in the susceptibles.

Unction About one dram of unguentum hydrargyrum or unguentum hydrarg oleatis should be rubbed daily on the hairless parts

of the body for half an hour. The best sites are the pectoralis muscles and the sides of the chest, flanks, the hairless inner side of the thigh, each for one day, six days in the week. All these sites daily one after the other are utilised for inunction. The seventh day, preferably Sunday morning, the patient should take an effective dose of saline purgative and a warm bath, no inunction being given on that day. This cycle is to be repeated till a full course of forty to sixty inunctions are given. After each eighteen such, a period of three to seven days rest is preferably advocated.

A suitable method of treating congenital syphilis is by smearing over a flannel binder one of the ointments mentioned above and the child's abdomen wrapped round with this. It is to be kept for twelve to eighteen hours and is repeated as required. Unguentum hydrargyrum has been found to be more uniformly and easily absorbed than the oleate or the calomel ointment. Inunctions though quite effective, are messy and there is risk of some cumulative action as in all mercurial remedies.

Oral administration. The following mixture may be taken with hot milk to prevent iodism, twice daily after food for five to six days in a week, by an adult with one to two days' period of rest per week. After three weeks' course a week's rest should be given. Then again the whole course is to be repeated once or twice according to reaction, presence or not of mercurialism and so on.

Potassium iodide	gr	10 to 30
Liquor hydrarg perchlor	m	60
Tincture card co	m	10
Syrup Auranti	m	60
Aqua menthipp	ad fl	oz 1

Iodine may be given in five grains to start with, to be increased gradually. For children the dose may have to be modified according to age, body weight, and so on.

Hutchinson's Pills

Hydrarg cum crete	
Pulu specie Co (Dover's powder)	11 gr 1
Extract gentian	ad gr 5

one pill three to four times a day, after some food, six days in the week. To prevent the colitis and consequent diarrhoea caused by hydrarg, the corrective, namely pulv specie co is added. One course consists of a month to six weeks treatment. The complete period should consist of two to three such courses, with ten to fifteen days rest after each one. The main difficulty in oral medication is the variability in absorption of the drug according to the power of assimilation of the individual.

Fumigation This method has now become more or less obsolete. *Precautionary measures to be taken before giving hydrarg* As there is some risk for the teeth and gum under hydrarg medication, care should always be taken to keep them clean by regular use of a hard brush and good tooth paste. A gargle several times a day of two drams of potassium chlorate to eight ounces of distilled water may prove useful. Caries in the teeth should be filled up. With appearance of the early symptoms of poisoning the drug should be stopped.

Symptoms of mercurialism The symptoms of acute poisoning are severe colitis, with swelling of the gum margins, salivation, loss of appetite, dysentery like symptoms and so on. In chronic poisoning which is more common, there is metallic taste in the mouth, increase of salivary secretion which becomes thick and ropy. There may be fetor present in the breath. The gums may be swollen and spongy, the salivary glands also share this swelling. Loss of appetite, diarrhoea may appear.

Treatment of mercurialism Further medication should be stopped. Injections of sodium better calcium thiosulphate and contramine as given in poisoning by neoarsphenamine group is of service. Potassium chlorate orally in two to four grains, thrice daily may be useful. Frequent gargling of a hot solution containing equal proportion of saturated solution of alum and potassium chlorate may be helpful. Painting the gum margins with a concentrated solution of tannic acid may be of relief. Injection of atropine sulphate in one hundredth of a grain or tincture belladonnae in seven to twelve minims twice daily is advocated. Hot bath with proper massaging of the body may be comfortable. Adequacy of the vitamins, notably A, B and C may hasten recovery. The anaemia and debility may have to be treated by big doses of iron after food. Tonic, good food and medicines by improving appetite and digestion may be of value. It should be noted that it is good systemic resistance, on which we have to depend to overcome all diseased processes, hence no pains should be spared to raise the defensive power of the system. Exhibition of iron in big doses injections of liver extract may do good during the period of intermission between courses of mercury.

Iodides This is usually given in the form of potassium iodide in ten to thirty grains, preferably with hot milk thrice daily. When given with warm milk iodism is very uncommon. It should always be exhibited in increasing doses of even half to one dram thrice daily for gummata and in other resistant forms of this disease.

It has no direct action on the spirochaetes, but helps in dissolving the gummata, thus the organisms are laid bare to be acted upon by the antisyphilitic spirocheticidal drugs. The unsaturated fatty acids near about gummatoous tissues prevent the normal lytic juices from

acting on them, the iodine from the iodides given orally saturate these unsaturated fatty acids allowing the trypic juices to act on and dissolve them.²³ This is why potassium iodide appears indispensable in the treatment of syphilis, notably at its later stages.

Snodgrass (1935) tried the effects of iodides of potassium and sodium on 1750 cases. He concludes, as others do, that the spirochetes are not destroyed by iodides, but help the healing up of syphilitic lesions. Iodism was common in smaller doses. The taste of the drug is well disguised and iodism was very rare when it was taken with hot milk. Sodium iodide may be given intravenously in even sixti to ninety grains in a ten per cent solution. When required such medication could be reinforced by oral exhibition of iodides.

RECENT IDEAS IN TREATMENT OF SYPHILIS

Latent Syphilis²⁴ It is not uncommon and should receive prompt treatment because (1) such persons are sources of infection to others, if a female may transmit the disease to the children, (2) to avoid more serious development notably of the nervous and cardiovascular systems.

Continuous versus intermittent method of treatment Stokes and others (1931)²⁵ basing on their experience on the United States public health service recommend a continuous line of treatment of seventy weeks and claim satisfactory results in 79.7 per cent, whereas only in 65 per cent by the intermittent line of therapy.

The schematic outline of the above workers as given by Moore (1932 and 1933) is as follows:

The total consisted of thirty two injections of neoursphenamine group and thirty eight of bismuth.

The neo-arsphenamine is given in five courses. The first course consists of eight injections, first three at the interval of five days the remaining five and the rest of the injections in the other four courses are given at weekly intervals. Each course of arsenical alternates with one of bismuth. The five weekly courses of bismuth are progressively increasing, the number of injections being four in the first, six in the second, eight in the third and ten each in the fourth and fifth weeks. These injections of bismuth appear too closely spaced, and symptoms of poisoning are not unlikely.

Some workers of Toronto²⁶ advocate, in seronegative primary cases 6.2 g of neoursphenamine and 1.9 g of heavy metals. In seropos-

23 Burke (1931) Arch. of Dermatol and Syph. 11 p. 404

24 Moore and others (1929, 1932 and 1933) Ven. Dis. Inform 1-6 20th 1929 Aug. Sept., October 1932 January 1933

25 Stokes and others (1931) Jour. Amer. Med. Assoc. 102 21st April p. 1261

26 Trow, Black and others (1931) Canad. Pub. Health Jour. 25 p. 422

tive primary and secondary cases 11.6 g of neo arsphenamine and 1.7 g of heavy metal as a routine. The total amount of the above remedies is much less than that advocated by the expert committee of The League of Nations,²⁷ who based their recommendations on thirteen thousand case notes mainly of primary and secondary syphilis.

The valuable points in the recommendations of this expert body are summarized below —

1 Syphilis at the sero negative primary stage should be diagnosed by finding the spirochaetes in the clear serum from sores microscopically. Treatment should be started as soon as possible.

2 Before commencing treatment the sensitiveness of the patient to the injectable medicines should be tested and the tolerance as to the total dosage ascertained.

3 During the whole course of treatment a careful watch should be kept as regards the functional activity of the mucous membranes skin, kidneys and the liver. They are the channels of excretion, hence they should be at their optimum activity.

4 The patient should be kept under observation from serological and clinical point of view for not less than three years after the completion of the treatment. The cerebrospinal fluid should also be examined before finally giving up observing him.

5 They recommend comparatively bigger individual doses of arsphenamine and bismuth or mercury given more frequently particularly, during the earlier period of treatment. To maintain a persistent attack on the organisms a continuous method, without interval, more or less in the lines of Moore is advocated. According to them, as much treatment should be given to the patients at the primary as to the secondary stage of syphilis.

6 They, from the huge data at hand, could not definitely ascertain whether the continuous, or the intermittent intensive method of treatment, with short periods of rest was more efficacious. They however, recommend one continuous and another intermittent line of treatment, both being almost equally effective and practicable.

Intermittent. The intermittent method is in one sense continuous in view of the fact that bismuth is absorbed continuously from the site of injection for sometime even after temporary suspension of treatment. The plan for adult males, without any contraindication, are four courses of nine weeks each, with a rest period of a few weeks after each one. Each course consists of eight weekly injections of 0.6 to 0.75 g of neuarsphenamine group, along with, are given ten intramuscular injections of 0.2 to 0.4 g of some insoluble compound or

27 Report of the committee of experts on Syphilis etc. League of Nations Lancet, (1935) May 18th p 1170 and Brit Jour Ven Disease 40 p 69

prolonged course of treatment, than advocated in former days, is required for a proper cure of this infection

Resistant syphilis The failure of proper response to treatment, in certain persons, is thought by some workers³⁰ to be due to lack of response mainly of the reticulo endothelial system of cells. For these cases, stimulation of the systemic defence by artificial fever therapy is advocated. For this purpose artificial malaria, typhoid vaccine intravenously or other foreign non specific proteins have been tried. Fourteen cases of interstitial keratitis, besides others, were treated by malarial fever therapy, causing the acute symptoms to disappear from four to eight weeks time. This fever therapy is a very promising line of treatment in syphilis and should always be thought of in refractory cases.

Pyrogenic Treatment The effect of mechanically produced pyrexia on early syphilis was studied by Epstein and Cohen³¹ (1935). They devised a mechanical arrangement in which the body and the limbs of the patient were enclosed, and the temperature of the air inside was raised to 104°F or more. This temperature was maintained for six or seven hours. The patient was given one hundred and sixty c cm of hot lemonade containing 0.6 per cent of sodium chloride every half an hour to replenish fluid and salt lost through perspiration. Sedatives are also given when there is restlessness. The treatment is repeated every three to four days. Out of thirty three cases of early syphilis, all showing spirochaetes in their serum, twenty seven became negative after the third or fourth exposure to heat. The majority, nineteen, became negative by the beginning of the second sitting.

The clinical effects corresponded with those observed on the spirochetes. This confirms the results of animal experimentation, that, high temperature that can be tolerated by human beings are damaging enough to the causative organisms, suggesting that high rise of body temperature produced by physical agencies, can be a valuable adjunct in the treatment of syphilis.

FEVER THERAPY

Malaria Many workers including Wagner Von Jauregg (1918-19) Muhlen³² (1920) and others³³ have shown that artificial infection of malaria by injecting one to two c cm of blood of patients suffering from this protozoal infection (benign tertian preferred) by raising the body temperature, was beneficial to persons suffering from general paralysis of the insane. But it soon became evident that a rise of body temperature up to 104 or more degrees, Farenheit was beneficial to all

30 Dennie and Mc Bride, (1934) Arch Dermatol and Syph 30 p 1

31 Jour Amer Med Assoc, (1935) 104 March 16 p 883

32 Munschen Med Woeh, (1920) July 16th

33 Paulin (1936) Ann d Mal Ven 31 p 561

forms of syphilitic disease. Though some differ³⁴ from this idea Ditherm³⁵ has been found useful by some

Foreign proteins of various types including milk protein, intravenous typhoid vaccine and other fever producing agents have been found useful too, in all forms of syphilis.

But for actually practising the above methods of therapy one must have experience in these forms of treatment.

Injections of sterile milk, given intramuscularly into the glutens produce different grades of febrile reactions according to susceptibility of individuals. The particular brand of the preparation has got much to do with the production of the reaction. It is always advisable to start with small intramuscular doses say one to two c cm, once a week, if there is a fair reaction. If there is no reaction the dose will have to be increased till moderate, then, marked reaction with pyrexia up to 103° or 104°F is produced.

Induction of Malaria in general paralysis of insane and other forms of syphilis, inoculation of one to two c cm of blood of a person suffering from or harbouring active benign tertian malarial parasites has produced satisfactory results in many cases. Usually after an incubation period of four to nine days the paroxysms or fever start and the good effect is largely proportional to the height of the temperature secured. The number of paroxysms of fever required to produce satisfactory therapeutic effects range from two to a dozen or more and is conditioned a good deal, by the patients' tolerance of the treatment. Once the desired number and grade of pyrexia is attained quinine therapy in doses of five grs each thrice daily for a few days cures the malaria. Some prefer after the convalescence, to administer neours phenamine in average cases, and tripterygium in neurosyphilis.

The results of induced Malaria Pyrexia have been quite satisfactory in thirty three percent, some improvement in another thirty three percent and none in the rest thirty three percent of cases of general paresis.

But there has been a mortality ranging from one to thirty percent in malaria therapy, depending upon the choice of the patients and the experience and caution of the doctor. Such treatment should never be taken up light heartedly, and persons of very weak health or having cardiovascular syphilis are usually unsuitable subjects for this therapy.

Typhoid Vaccine Kunde³⁶ (1927) and his co-workers have used the intravenous weekly injections of typhoid and para typhoid group

³⁴ Beck (1926) Jour of Ment Sci 82 p 24

³⁵ Neumann et Osborne (1931) Jour Amer Med Assoc 96 p 74, 12.

³⁶ Kunde Hall Gretz (1927) Jour Amer Med Assoc 1027 89 p 1391

of organisms, the usual initial dose being about two hundred million organisms till by the twelfth dose about four thousand millions are reached. Each dose is increased rapidly from the previous one. But the disadvantage is that by this intravenous medication rapid production of immunity against the antigen in the patient, prevents further marked reactions to take place in some cases.

Nelson³⁷ (1933) proposed a method of securing higher temperatures with typhoid vaccine, by giving a second injection at the height of the fever.

One of the recent, but very painful, methods of induction of high temperature consists in the intramuscular injection of suspension of finely divided sulphur in oil. It is so painful that morphine has got to be given to relieve the pain. But the rise in temperature is very pronounced, the therapeutic effect good and the morbidity practically negligible.

Prenatal Syphilis

Prenatal syphilis gives good opportunities for adequate preventive measures. The possibilities may be discussed profitably under the following headings:

- 1 Control of the transmission of syphilis in sexual life and conception
- 2 Prevention of conception during the infective period
- 3 Treatment of one or both partners, before conception
- 4 The treatment of pregnant woman, and through her, of the child in the womb

We are here concerned mostly with the last question, because the preceding three items can be adequately dealt with by the lines of treatment chalked out already for early or late forms of syphilis. By thoroughly treating one or both the partners as the case may be, before conception the transmission of syphilis to the child, may be prevented.

TREATMENT OF PREGNANT WOMEN

Boas and Gammeltoft³⁸ (1928) in their series of two hundred and one mothers suffering from syphilis, but receiving no treatment 96.5 percent of the children were syphilitic and 3.5 percent only healthy. Of the eighty seven syphilitic mothers receiving treatment by mercurials only before pregnancy gave birth to ninety percent of syphilitic children ten percent of healthy ones and so on.

symptoms following injections of organic arsenicals. But generally it is safe to avoid arsenicals at the beginning of treatment of cardiovascular syphilis for the reasons given above.

The principle of treatment is to start with injections of mercurials or bismuth and oral administration of iodides the patient resting in bed all the while and all manual work being suspended. This rest should specially be enjoined in cases of aortic incompetence with cardiac enlargement because in such cases organic arsenicals if used, may do serious harm by temporarily flaring up the lesions.

Liq Hydrarg Perchlor	m	60
Pot Iodide	gr	10 to 30
Spt chloroform	m	5
Infusm Gentian Co	nd fl oz	1

The above mixture may be taken twice daily in hot milk for the first six days and thrice daily subsequently. Some give Hutchinson's pills consisting of one gr each of grey powder and Dover's powder in a pill form twice or thrice daily the iodides being given orally in gradually increasing and bigger doses.

During the whole course of treatment the teeth and the gums should receive close attention and the medication stopped as soon asropy saliva or gingivitis or soreness of the gums or other signs and symptoms indicating poisoning by mercury appear.

The American workers are in favour of injections of sodium bismuth tartrate Searle intramuscularly two c cm of one and a half percent solution twice weekly. Ten injections are given along with oral exhibition of potassium iodide in suitable doses.

Once the patient's symptoms have abated under the above therapy One can try intravenous or intramuscular injections of *organic arsenicals*. But care should be taken to start with very small doses, and the initial safe dose appears 0.2 gram for an average adult.

The whole course should consist of ten weekly injections and the maximum dose should better not be larger than 0.6 gram. The usual precautions are taken as before all arsenical injections. They are best given in the evening so that the patient may rest the whole night. He should not leave his bed a few hours, preferably the day following the injections hence the writer gives these on every Saturday evening so that the Sunday is spent in bed. Though very effective in bringing about quick resolution organic arsenicals are rather risky specially in advanced or moderately severe cardiovascular syphilis for reasons given above.

Bismuth According to Boland and others bismarsen is better than mercurials and potassium iodide in congestive failure of the heart, in cardio aortic syphilis. Bismostab or hypoloid bismuth metal in 0.2

gram doses by weekly intramuscular injection, of ten to fifteen such, in a course, may be quite useful Sodium bismuth tartrate, the American favourite in cardio vascular syphilis has already been discussed

Iodobismuthate of quinine Three c cm of a ten percent oily suspension, given intramuscularly at above mentioned interval, till fifteen to twenty injections constitute a course

Duration of treatment The whole complete course of antisyphilitic treatment should be spread over a period of two to three years as discussed above

AORTIC INCOMPETENCE AND AORTITIS Marked enlargement of the heart or pronounced incompetence with or without cardiac pain, generally contraindicate organic arsenicals To relieve pain, injections of bismuth and potassium iodide per mouth are often good But pre cordial pain persisting after complete rest in bed may mean stenosis or occlusion of the coronaries, rather a serious matter, requiring special treatment.

Heart failure Rest, bismuth, potassium iodide, sedatives, when oedema is present, salsyrgan, beginning from 0.5 to 1 c cm once a week are effective Digitalis is contraindicated, according to Lambert 'syphilitic heart is apt go to pieces on large doses of digitalis quicker than on anything else'¹⁰ Glucose, euphyllin and others may be tried

Angina of Syphilitic Origin Absolute typhoid rest is essential, it is better to try either bismuth or mercurial injections combined with oral iodide therapy Specially rest must be absolute when there are symptoms of cardiac failure or marked incompetence of the aortic valves

Other remedies such as morphine, euphyllin, glucose, adrenalin, ephedrine may be given consideration of, sometimes in hypertensive subjects 1/100 gr doses of trimtrin tablets are of use Nepenthe or tr opiu in 10 to 20 m doses, or morphine and atropine may have to be used freely when the pain does not disappear on rest Inhalation of oxygen turned out at a rapid rate (two liters per minute) is useful to relieve pain when there are signs and symptoms of deficient oxygenation

Aneurysms Rigid restriction of physical exertion is imperative in cases where aneurysm is present When the size is moderate with or without pressure symptoms, intensive but cautious antisyphilitic treatment may result in a reasonable recovery The best remedies are pot iodide, bismuth and hydrarg, the first given orally the last two by intramuscular injections When there are obstructions in the branches of trachea, iodides are not well tolerated and should be given cautiously, with an watch upon the untoward subjective symptoms and objective

symptoms following injections of organic arsenicals. But generally it is safe to avoid arsenicals at the beginning of treatment of cardiovascular syphilis, for the reasons given above.

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findings In these cases injections of entodon, which is a twenty percent solution of hexamethyl diaminoisopropanol biniodide, in $\frac{1}{2}$ to 2 c.c.m doses, said to give off iodine readily and may be tried. In intolerance of pot iodide this preparation of Bayer is said to be of use. Iodogenol, a French preparation is also said not to produce iodism.

Rest, absolute and complete, is imperative in all these cases and is specially indicated in acute or pronounced cases with or without heart failure. Failure symptoms indicate that rest is imperative. Prognosis often depends besides other factors upon how long the patient can afford to rest in bed while receiving the treatment.

Too vigorous methods of therapy are always contraindicated in syphilitic lesions in such vital but delicate structures as the aorta coronaries, and other vessels where slight aggravation of the lesion may mean even death. So, as in all our treatments individualised and cautious procedure, based on the experiences of yesterday's result is the safe guide in handling of such vital structures.

The Results They are quite well when the treatment is begun before marked aortic incompetence and cardiac enlargement start though unfortunately, it is not possible to get many cases at this stage. It is only at the early stage of the disease that adequate treatment may produce anything like a clinical cure. Once the aorta is damaged, even to a slight extent, may terminate to a serious issue, and thus result in incompetence, inspite of vigorous treatment. But even in frank aortic incompetence if adequate treatment is instituted life appears to be prolonged. Because cases of early cardiac failure of syphilitic origin seldom live more than eighteen months but vigorous anti-syphilitic treatment with prolonged rest may prolong life.

TREATMENT OF NEURO-SYPHILIS

Meningeal and muscular syphilis should be treated in the line of systemic infection by spirochetes as already suggested. Here potassium iodide in gradually increasing doses beginning from small ones say initially starting from ten grs may have to reach to one drachm thrice daily after food with hot milk. It is of special use by dissolving gummatous tissues and giving easy access of the spirochetal drugs to the hidden organisms.

The intraspinal injections of neosalvarsanised serum after the methods of Swift Ellis or Ogilvie, have not proved their worth. But some workers are in favour of original salvarsan, than neosalvarsan in the treatment of neurosyphilis.

In all forms of nervous manifestations of syphilis the treatment has got to be very prolonged and intensive.

PARENCHYMATOUS SYPHILIS

*Tryparsamide*⁴¹ is generally useful in the treatment of parenchymatous neurosyphilis. The following facts about tryparsamide are important.^{42 43} It is a pentavalent arsenical compound of the atoxyl series.

(1) Tryparsamide—should be employed and limited to the neurosyphilis of the paretic and preparetic types.

(2) It should not be used except after six to eighteen months as according to Moore⁴⁴ and his coworkers it is of special use only in neurosyphilis which do not usually appear before six to eighteen months after the primary infection.

(3) Like all other forms of therapy in syphilis, the earlier the treatment is begun the better is the prognosis. In neurosyphilis too this holds good.

(4) Tryparsamide sometimes produces therapeutic shock in patients with signs and symptoms of cerebral involvement. In mildly excited types, even maniacal phase may appear for which the patient's relatives must be made to get prepared and ready.

(5) There is a general tonic and weight increasing effect of tryparsamide but there are a few stray cases in which symptoms of intolerance may appear. Advanced neurosyphilis, in thin subjects, the drug should be given cautiously, as cases of death even are reported from such treatment specially when given in over dosage.

(6) Tryparsamide is given in about one to three grams. Smaller doses tend to cause irritation. It is injected intravenously very slowly in ten c cm of redistilled water, only once a week, upto a total of forty to a few hundreds of grams.

(7) The great drawback is its tendency like atoxyl to produce optic atrophy, which generally comes within the fifth to the tenth injections. Mere examination of the fundus is not enough but careful examination of the field of vision by exact perimetric tests and the test for the acuity of vision are essential.

(8) After a period of rest of thirty days, cases have been treated again in whom optic atrophy threatened.

Under tryparsamide therapy in a series of 317 cases of neurosyphilis eighty seven per cent were found satisfactorily restored to

⁴¹ Sloan and Woods (1928) Amer Jour Syph Gonorr and Ven Dis 20 p 583

⁴² Stokes and Chambers (1928) Amer Jour Med Sci 175 p 705-708

⁴³ Lorenz (1928) Jour Amer Med Assoc 90 p 1285

⁴⁴ Moore and others, (1924) Ibid 83 p 888

physical and mental health, after a five to six years' period under observation. But it must be remembered that tryparsamide is of special use in parenchymatous neurosyphilis.

TBES DORSILIS

Tubes The treatment mainly aims at preventing further destruction of the neurons and other structures, caused by the disease.

One of the best result is claimed to have been obtained by silver salvarsan given per vein in 0.15 to 0.25 gram doses and ten weekly injections constitute one course. Sometimes good results followed spinal drainage by lumbar puncture an hour after the intravenous injection.

Bismuth hydrarg and arsenicals should also be given in proper dosage and methods with oral exhibition of pot iodide. The course of treatment should not be lesser than at least two years. Maximum treatment is indicated for these patients.

Malarial therapy and artificial hyperthermia have proved of value. They are in the same lines as indicated in the treatment of general somatic syphilis. More recent workers are in⁴⁵ favour of mechanical hyperthermia and facts are in its favour.

The patient should be at rest and warmth is gratifying. Any debilitating condition such as fatigue worry cold drenching, alcohol excesses of all types are to be avoided carefully.

GENERAL PARALYSIS

General Paralysis No therapy is of such use as artificial malarial inoculation and artificial hyperthermia. Plasmodium vivax infection induced artificially as advocated above in the general treatment, is the therapy of choice. The limitations risks and other considerations dealt with above hold good here too.

The general lines of treatment and improvement of general health by tonics vitamins proper care of teeth mouth, oral hygiene all are of value.

Lastly the treatment of all forms of neuro-syphilis either meningo-vascular or parenchymatous require prolonged and adequate treatment in the lines chalked out under the lines of somatic syphilis.

Commoner Diseases of Lungs

CHAPTER XXXVI

CHRONIC BRONCHITIS & EMPHYSEMA

(Winter Cough)

Diagnosis Chronic bronchitis of the winter months mostly in males of or past middle age specially of certain families often with emphysema¹ at the later stages, resulting as a rule from constant and sometimes protracted bouts of cough more troublesome early in the morning and evening is pretty common in big cities. The patient often does not feel relieved until he has been able to expel the secretion. The history of these cases are generally something like the following A person who has in occupation in dust or smoky atmosphere one stagnant winter evening probably after an exposure to chill or after getting soaked or due to insufficient clothing diet etc gets a cough in which the throat and upper respiratory passages are mainly involved. The next winter a bronchitis of short duration develops, to recur in the next but lasting longer, and gradually in successive years the affection lasts longer and the free interval decreases till in bad cases the suffering of the patient becomes more or less continuous with a free interval during the height of the summer. There may be associated with this chronic bronchitis and emphysema, tuberculosis fibrosis of the lungs bronchiectasis sinusitis terminating in congestive cardiac failure due to the lack of normal power of aspiration of the venous blood and compression of the blood vessels in the lungs. Hemoptysis subcutaneous emphysema pneumothorax etc from rupture of a bulla in the lung are not uncommon.

The emphysema is generally secondary to alterations fibrosis in the bronchial tree pulmonary blood vessels and lung owing to spasm or mucous obstruction in the bronchi or bronchioles resulting from repeated inflammations.

The third clinical condition associated with it is asthma and is probably related to the obstruction with spasm of the tubes and emphysema. But to ascertain the relation between cause and effect in these conditions is extremely intricate and the general opinion of German² workers in this line is that all cases of chronic bronchitis and emphysema specially when occurring in earlier years have an allergic or asthmatic basis that is to say, a reflex hypersensitivity of the respiratory apparatus.

As regards physical findings the chest is usually found in the position of inspiration and may appear very full or barrel shaped, the expansion at inspiratory effort is curtailed from normal two to three inches to one inch or so. The apex beat may not be palpable due to emphysema there is hyper resonance or rarely a drum like note on percussion the cardiac and liver dullness may be obliterated or appear too small. The auscultatory findings are variable prolonged expiration but scattered rhonchi distributed more or less bilaterally,

1 Christoperson, (1933) Jour Amer Med Sci, 186 Oct p 591

2 Medical Annual (1930) p 96

3 Hurtado Fray and others (1931) Jour Clin Invest 13 p 1027

help to come to a diagnosis. In asthmatic states there may also be present the typical wheeze. There may be found the atrophic type of emphysema where the diagnosis is not easy.

In investigating the case the possibility of tuberculosis should be remembered specially when the cough persists during the summer months and the patient loses weight. Sialographic examination after lipiodol injection to exclude bronchiectasis, unsuspected tuberculosis and fibroid condition of the lungs earlier in life should have to be excluded. Culture and microscopic examination of the sputum should be done. Where possible a bronchoscope may show some important hitherto undetected change.

TREATMENT

Prophylaxis. As chronic lung inflammation and cough lead to other troubles like emphysema and asthma the first claim in this vicious circle, namely the bronchitis should receive our best attention and thus the cough which is mainly responsible for the production of emphysema should be checked. Sometimes the fault may be found in some septic focus either in the throat or the sinuses, teeth, tonsils, gall bladder or in obesity, nephritis, diabetes arterioclerosis and so on. Work in dusty, damp, smoky, overheated or draughty conditions are to be avoided or modified. If this cannot be helped, the patient should at least go to a dustless dry atmosphere having a bracing climate during those months of the winter season when he is found to suffer most from this trouble. All excesses in smoking, drinking, overwork, chill, fatigue, etc., are to be avoided. Constipation is bad for these subjects.

Autogenous vaccine in suitable doses may be of use. But in the choice of dose much care is needed. If the patient shows extra sensitiveness to vaccines of average dosage lesser number of organisms should have to be chosen. In naso pharyngeal sensitiveness, only suspensions of menthol chloretone and other drugs like instol or endrine may be useful. Preparations containing ephedrine are of service in cases showing asthmatic tendencies, sensitiveness and where there is much local vascular congestion. Endrine contains small amounts of ephedrine hence is useful in these conditions.

The patient should be made to live in the open as much as possible. Sudden variations in temperature are to be avoided. Hot stuffy rooms, like cinema houses, theater halls are bad for him. Whenever possible change to a better and bracing, dust or smoke free dry atmospheric condition is beneficial. High altitudes are, as a rule not well tolerated by emphysematous subjects. Sea side places or sea voyages are of service to most of them. They are as a rule too warmly clad and sleep with doors and windows closed. These are pernicious habits and should be rectified.

In cases of the elderly persons with anaemic tendency, syrup toni may be replaced by syrup ferri iodide, in dram doses. In cases of foul sputum, in place of ammonium chloride, thiocal in four to six grains may be used with advantage. The medicine is to be taken twice daily after some food, preferably in sips with equal quantity of warm water. The well known "hot water mixture" of the Bromptom hospital is of good use to promote expectoration on rising in the morning, and to clear the tubes before going to bed. It consists of something like the following

Sodium bicarbonate	gr 10
Sodium chloride	gr 3
Spirit chloroform	in 5
Aqua Amisi	ad fl oz 1

To be taken one dose with equal quantity of hot water in sips

The hacking dry fruit less cough, may have to be allayed by syrup codeine phosphate or by ordinary linctus, as trochesi glycrrhizae, or ipecac et morphine and others. The menthol pastilles kept in mouth may be of some relief.

Inhalations generally though not of much relief, yet tincture benzoin compound is probably one of the best for this purpose. Oil of eucaliptus, oil of pine, or creosote may be given through inhalation in a respirator. Recently the Duke Fingard⁵ method of inhalation treatment has proved effective in these cases.

When there is sleeplessness due to cough etc., or exacerbation of asthma, a simple sedative mixture containing one dram each of linctus diamorphinum cum ipecac linctus drunophilum et scilla syrup pruni serotinae at bed time may do good. When they fail, hypnotics like either oral one tablet of four grs., or medicinal in three to five grains or ipral calcium or allonal one to two grs may have to be tried. When they fail heroin 1/12 gr or morphine and atropine 1/4 gr of the former and 1/200 gr of the latter may be used with advantage. But these hypnotics of the barbiturate group and morphine preparations, are depressant to the respiratory centre hence unless the insomnia is very exhausting these remedies should not be prescribed. Paraldehyde and bromides in suitable doses may produce some sedative effect and are very suitable for these cases, notably when the heart is weak.

In associated congestive cardiac failure the underlying pathological process is usually so advanced that complete recovery is very unlikely. In the presence of cyanosis, dyspnoea, and engorgement of the veins, congestion of the liver, all the methods followed to relieve congestive cardiac failure may give some relief.

codliver oil or some vitamin concentrate like aderol, vitidex, haliverol etc., may be added with advantage, particularly due to its A and D vitamin contents. In these persons there is as a rule deficiency of hydrochloric acid secretion hence it is given after meals with some effect. Solid meals should not be given at night and if taken at all it should be finished by dusk, as in asthma. The noon meal should be the principal one. In cardiac failure or associated renal disease with or without hypertension, a more or less lacto-vegetarian diet may have to be prescribed. Adequacy of C vitamin is of value.

Other forms of treatment. Various devices are being improvised to bring back the elasticity of the lungs. Compressed air chambers may give considerable, even some permanent relief. But it is not to be advocated for plethoric hypertensive subjects. There are certain spas and watering places in England and Europe where special methods of treatment are given with some, but variable success.

CHAPTER XXXVII

BRONCHIAL ASTHMA

Definition. The derivation meaning of the term asthma is "gasping". It is used to indicate a peculiar type of dyspnoea which is characterised by difficulty in inspiration but more so in expiration or both and accompanied by an audible wheeze apparently due to obstruction to the flow in and out of air in the glottis and tubes. As there are so many varieties of conditions giving rise to the symptom complex of asthma that the diagnosis of this syndrome should if possible be qualified by such terms as pollen asthma, horse asthma, food asthma etc according to the sensitiveness of the patient and the allergen giving rise to the symptoms. The term bronchial asthma is commonly applied to those attacks of expiratory dyspnoea going on steadily and in regular attacks without any apparent disease. It is not exactly the disease but a symptom complex.

Peculiarity. Majority show symptoms before the age of twenty five¹ twice as frequently in males as in females. It has a tendency to run in families of a neuropathic tendency and unstable nervous system as shown in other members or generations either by urticaria, hysteria, migraine, angioneurotic oedema, epilepsy, dermatographia, eosinophilia, etc. There may be undue susceptibility and sensitiveness towards foreign proteins. This may be transmitted to the next generation. Any disease which tends to lower the threshold of resistance may precipitate an attack. Exhaustion, fatigue, worry etc may act in the same way.

Exciting agents. The factors in the production of all allergic states are in short the following²

1 O'Keefe (1936) New Eng Jour Med 214 p 63

2 An index of treatment, (1936) Allergic diseases p 23 Edited by R Hutchinson

The factors are in components of two e.g.

A Allergic heredity and tissue damage B Particular allergen & exciting factor, resulting in, allergic reaction

1 Dietary	Absorbed by —
2 Environmental	
3 Nasal	1 Inhalation
4 Toxic	2 Ingestion
5 Psycho	4 Infection
6 Endocrine	
7 Physical	5 Contact and carried by blood to shock organ
8 Chemical	
9 Mechanical	

As there are so many varieties of cases and factors it would be too much to expect cure of all cases by one fixed mode and line of treatment

Vagotonia In these persons vagotonia predominates and stimulation of the vaginal endings in the bronchus may simulate the signs and symptoms of bronchial asthma. It is characterised by vascular turgescence of the bronchial mucous membrane spasm of the bronchial muscles and increased secretion of the mucous glands and so on

Irritation, Infection, Digestive Symptoms.

But it should clearly be understood that this symptom complex is not due only to allergic phenomena but also to vagotonia lowered resistance undue susceptibility inherited or acquired to foreign proteins etc. Diseases of the nasopharynx chronic catarrh polyp adenitis unhealthy tonsils deviated septum acute or chronic infections of the respiratory or other systems are sometimes the potent causes of asthma. Digestive disturbance achlorhydria overloading of the stomach irritation of intestines constipation etc are sometimes the exciting factors. In unstable nervous system excitement, depression may induce an attack.

Generally though begins early in the morning or late at night yet may start at any time of the day or night. There may be undue irritability (asthmatic aura) manifested by restlessness irritability exaltation or depression itching of the nose, chills bouts of sneezing flatulence, corvza poluria and so on

Such warnings may not be constant. In a typical attack the patient rises up from bed with a feeling of suffocation there may be, specially in the early attacks some restlessness anxiety and a sense of alarm. The young adult sitting up leaning forward either on the table, or holding on to something so that every accessory muscle of respiration may help to get breath for him is a picture which seldom misleads the careful observer. Though laboured the respiration is rather slow but difficult with a prolonged expiration. The expression is anxious and distressed the patient looks pale and the lips are dusky. The wheezing may be audible skin is usually moist and sweating may take place. The chest already in the phase of inspiration though more as a whole through the violent activity of the accessory muscles of respiration there is hardly any true expansion of it. It is hyper resonant and emphysematous with obliteration of the cardiac and hepatic dullness. On auscultation sounds like those in music-box giving out rales of all kinds, mostly dry and squeaky are heard. The expiration is prolonged, may be accompanied with

true bronchial wheeze. On measurement there is very poor expansion of the chest on inspiration.

Eosinophilia even upto thirty five per cent may be encountered in the blood. The perles' of Lérienec and Curschmann's spirals are highly suggestive. The sputum abounds in eosinophiles. There may also be seen Charcot-Leyden crystals.

Types Blackemann² (1927) has suggested five distinct types clinically:

First. A child between five to twelve years, has well defined attacks of asthma each lasting for several weeks, during which wheezing dyspnoea is severe and the cough distressing. The child is though comparatively well and comfortable in between the attacks there may be a persistent bronchitis or he may be unduely sensitive to foreign proteins. Chronic cough enlarged tonsils and adenoids with most of the associated complaints or some other physical defect may be there too. X-raygram of the chest not infrequently shows enlarged glands in the hilum of the lungs.

The Second Group. The subjects are generally thin young adults who are sensitive to some allergen and proximity to horses, dogs gives rise to an attack of asthma.

The Third Group These are worn haggard individuals of middle age the appearance though suggest tuberculous yet the patient is as a rule afebrile and cheerful. He generally shows a round chest breath sound usually diminished in loudness. There may be squeaky rales of variable nature coming and going according to the stage of the disease. Peculiar nasal character in the voice suggesting recent recovery from cold in the head, with the sinuses yet full of secretion is not uncommon in these persons. The excretion of their nose and throat is of importance. They often show nasal polypi and not infrequently involvement of the sinuses. These persons may be relieved to a variable extent by proper treatment in these lines.

The subjects of the fourth group are well nourished individuals of the middle life. Chronic infection of the respiratory system is more or less common sometimes with an intractable cough. The chest is barrel shaped the rales are often moist and consonating. The sputum purulent may even be bloody. Cyanosis and clubbing of the fingers are common in the long standing cases. The bacteria in the sputum are pneumococci of group three, haemophilus influenzae and streptococci.

While treating these patients the question of vaccine therapy specially auto-sensous and potassium iodide, and creosote and ipecac should be considered carefully as these remedies not uncommonly relieve such cases materially.

The last or the fifth group met clinically are encountered in persons above forty years of age well nourished their chief trouble is asthma the cough being of secondary importance seldom with any thick or purulent sputum. The history in each case was of asthma occurring in isolated attacks at fairly long intervals at the beginning later on becoming worse both in frequency and severity until finally they were separated by only a few days and each attack lasted for two to three weeks or so. Later, in these persons adrenalin which relieved the earlier attacks fails to give relief even in big doses. They may die suddenly in a bad spasm and autopsy generally reveals enlargement and dilatation of the right ventricle though these could hardly be detected clinically while the patient was alive. The asthma in them was tentatively considered to be caused by factors outside the respiratory tract the bronchial constriction being reflex in nature.

hydrochloric acid (2N) 28 c cm, sodium bisulphite 0.05 g distilled water upto 10 c cm, to be nebulized in triple spray and inhaled, this relieves asthma almost immediately and the effect lasts nearly an hour or more.

Medicines Hot strong coffee may help in some cases. The popular powders, cigarettes and sprays may or may not be effective. A powder like the following one has been found useful in relieving paroxysms.

Lphedrine hydrochloride	gr 2/3 to 1
Phenirone	gr 1/4
Luminal	gr 1
Extract Bellidonnae Sicum	gr 1/4
Sugar of Milk	ad gr 8

one powder when the paroxysm is intolerable, and should not be repeated before four to six hours.

If the attack does not yield to the above simpler lines of treatment, immediate exciting cause should be sought for, such as an indigested meal, a loaded rectum or some other allergen, such as proximity to animals, feathers, furs, pollen, some food stuff and so on. In such cases emetics enemata or good carminatives may be of service. Even if the attack does yield to injections of adrenalin, always search should be made for such exciting factors, though one must confess not always with good success. Injections of glucose, alkalies and stimulants orally may be of some service.

MANAGEMENT DURING THE IREL PERIOD

As suggested already by the clinical grouping the following thorough investigations may be carried out to facilitate treatment.

History One should enquire about the influence of season, place, proximity to animals, circumstances under which the patient gets these attacks and so on. Whether emotion or tiredness evokes an attack, if there is any other history of significance, any relation to dietary of any particular type and so on, should be carefully gone into.

Investigations Careful examination of nose⁶, ear, throat for any source of irritation is of use. Any septic focus, anywhere may be the cause of the trouble. The chest should be thoroughly examined, a skiagram, the examination of sputum should not only be done for tubercle bacilli, but also a cultural examination may be helpful. An immunizing protein should be utilised for desensitizing the patient particularly if the skin test proves positive. Though the results of such treatment are variable and not uniformly successful. The removal of tonsils, adenoids is advisable in suitable cases. For this purpose the

⁶ Moll (1934) Brit Med Jour ii p 239

⁷ Pearson (1937) Quart Jour Med 8 p 163

opinion of a competent throat surgeon may be of value. In the opinion of some workers cauterisation of the sensitive spots in the nose is of use.

Catarrh of the upper Respiratory passages. Not infrequently asthma is associated with catarrh of the respiratory tracts generally starting from the nasopharynx. For the bad chronic sufferers from nasopharyngeal catarrh associated with asthma the nostrils should be first washed out with a five to ten per cent solution of cocaine in normal saline the head having been thrown back instillation of about five to ten drops of a eight per cent solution of argyrol with fifteen drops of adrenalin per ounce may be of distinct service in some cases. There is much running from the nose after this and a piece of linen or silk may be used for soaking of the secretions. When once washed out the nose will soon regain its normal healthy state. Along with this nasal wash a prescription of the following type may be of some use.

Calcium gluconate	gr	8
Tincture ephedra vulgaris	m	20
Tincture Ipecac	m	1
Tincture belladonna	m	6
Potassium bromide	gr	8
Syrup Scilla	m	60
Aqua menthipp	ad fl oz	1

one dose thrice daily

In some persons cocaine may produce unpleasant symptoms in such cases a two per cent solution of ephedrine with equal parts of one in thousand adrenalin chloride solution may serve as the preliminary wash of the naso-pharynx and other sensitive irritable spots.

When there is the history of chronic bronchitis and cough all efforts should be made to improve the lung condition. In these cases a prescription like the following one may be of some service.

Tincture Ephedra Vulgaris	m	20
Fr Belladonna	m	6
Potassium Iodide	gr	4
Liq Arsenicalis	m	1
Liq Grindelia Liquid	m	10
Syrup Tolu	m	60

Infusum Senega ad fl oz 1

one dose thrice daily after meals, in sips with hot water

The above prescription may be used in cases when antiseptics and expectorants are indicated. In some cases of dry bronchial secretion with cough and asthma one may give potassium iodide grains four, tincture ipecac and antimoniate five drops of each with syrup tolu one dram to make up to one ounce by the addition of infusum senega. This was used by the doctors of the olden days with some efficacy when ephedrine was not discovered. These patients are more or less sensitive

pated and some laxative or purgative such as liquid extract cascara sagrada in half to one dram, may be added to the above prescription.

Rub the chest. In all chronic respiratory diseases rubbing of the chest with some suitable liniment does good by influencing the cough, and thus improves the asthma. This is of some use to many and of much use to some.

Nervous System. Most subjects of asthma have irritable and unstable nervous system. There may be sleeplessness, nervousness, either in the individual or a family history of doubtful nervous stability. In such cases bromides in five to fifteen grains twice or thrice a day, with or without chloral hydrate, may be used with advantage. Peacock's bromides contain about fifteen grains of bromide per fluid drachm, and may also be used with some benefit, notably to quieten an irritable nervous system. Prolonged emotion⁸ or fear, disturbance of vago sympathetic balance, causing diminished secretion of the adrenals, predispose the already sensitive to allergic states and asthma.

Diet, Digestion etc. Heavy meal or overloading⁹ the stomach is very often rewarded by an attack of asthma, hence it should always be avoided. Unless the patient is found sensitive to any special article of diet, there appears very little sense in withholding particular articles of food, simply because the latter caused some trouble with another asthmatic. The patients of asthma do find relief if they do not take any solid food after dusk, at least for two hours before going to bed he should avoid all foods and drinks. Dilute hydrochloric acid in fifteen to twenty minims with double the amount of glycerinum pepsini in half a cupful of cool water may be sipped through a tube or through the nozzle of a feeding cup, after the two principal meals and are found useful. This may have to be continued for the rest of the patients' life with some advantage to many and with much advantage to some. As mostly the protein fission products cause these sensitiveness some workers advocate a preliminary carbohydrate diet, to be gradually reverted to protein one by days if not by weeks. Other lines of management for digestive disturbances may have to be attended, specially from the point of view of intestinal toxæmia¹⁰.

Sprays etc. Regular and routine uses of patent sprays or smoking of cigarettes and local applications are to be deprecated, as the relief is temporary and the treatment symptomatic. Any treatment which does not help to diagnose the underlying pathogenesis and thus to eradicate it, is not likely to prove successful, hence the importance of proper investigation for effective treatment of cases of asthma.

8. Livingstone, (1935) Practitioner, 134 p 591

9. Feinberg (1937) Jour of Allergy 8 March p 280

10. Adams, (1935) Proc Roy Soc Med 24 p 205

Specific desensitization If the patient is found sensitive to any article, taken either by ingestion, inhalation, or through infection, and so on, injections of the same specific agent or agents, starting from very minute doses, and gradually increased according to reaction and subsequent effect, may be of service. The patient should keep off from any article to which he is sensitive either by inhalation, infection or ingestion. Autovaccines or stock vaccines may serve both as specific and nonspecific agents of desensitization. When the sputum culture shows micrococcus catarrhalis and bacillus Friedländer as sensitive organisms in the lung infection, auto vaccine made from the above bacteria is likely to be of some use.

Non specific, desensitization Non specific desensitization by milk protein, sterile two per cent peptone solution (Witte's) beginning from minute portions, gradually increased according¹¹ to reaction may be tried. Witte's peptone in five grains in a cachet, an hour before meals orally may serve as an ideal desensitizing agent. To produce pyrexia bacillus coli or typhoid vaccines have been used intravenously also with some success. Recently 0.3 c cm increased by 0.2 to reach upto 1.3 c cm of a 7.5 per cent solution of Martindale peptone, once a week, till about sixteen, the last few doses being 2.5 c cm, have been advocated¹².

Autohaemotherapy A few c cm of blood is withdrawn from the median basilic vein of the patient and given intramuscularly either in his opposite deltoid or the glutens. Generally one begins from one to two c cm every fourth day to a week, till near about ten c cm are reached. This has proved of some use in those cases where no apparent cause in the respiratory passages or any where else is to be found out. One to two c cm of a two per cent slution of sodium citrate may have to be taken in the syringe before puncturing the vein to prevent coagulation of the blood inside the instrument.

Tuberculin injections In non tuberculous subjects, injections of minute but gradually increasing doses of tuberculin have done good in several cases of intractable asthma. It is given subcutaneously one injection per week. Active tuberculous infection should always be excluded while treating by this agent. I have tried this treatment in a few cases with some success.

General Hygiene No stone should be left unturned to improve the general standard of health of the patient, as not uncommonly the same individual, under the stress and strain of fight in life shows sensitivity to agents or infections which he withstands during the normal time without turning a hair. One has noted several cases in whom any trivial infection of the upper respiratory passages would light up an

11 Vaughan (1932) Jour of Lab and Clin Med 18

12 Lubman and Bigland, (1937) Brit Med Jour 1, p 62

attack of asthma hence the importance of keeping the standard of health at the optimum level. A cold bath or cold washing or sponging of the neck and throat in the morning may make the parts resistant to sudden changes of temperature.

Deep breathing with forced expiration. Some moderate form of physical labour specially breathing exercises with careful effort at forced exhalation by pressing the lower parts of chest¹³ to increase the elasticity of the lungs are of value and should be tried in every case. This also tends to relieve the temporary emphysema and increases the diaphragmatic excursion by reducing the thoracic breathing.

A support for the lower abdomen. A support of the lower abdomen in the form of a broad belt put on early in the morning before rising from bed and left on till going to bed has been found of service. The other details may be seen from the previous chapter dealing with this particular question.

General health needs improvement

During the free periods effort should not be spared to increase the resistance of the patient and quieten the nervous paths and harden the mucous membranes of the system. For this purpose a good *vitaminous tonic* specially with adequate amounts of fresh fruits to supply *citamin* liberally is of service by reducing the sensitiveness to allergens.¹⁴ Change of climate to a place where the patient keeps well is also worth trying in proper cases. School children with asthma, may be taken to some other school where they keep well.

Medicinal Treatment to prevent attacks. The drugs of use are potassium iodide, tincture stramonium extract grindelia liquid spirit ammon aromat tincture ipecac tincture ephedra vulgaris and others. Arsenic in small doses is often found useful specially on prolonged use. Injections of sulfarsenol in minimum amounts or *soamin* in one to two grains are of use.

Precautions and dosage etc of soamin. Before giving these injections of soamin the urine should be examined to exclude any albuminuria. Generally given intramuscularly once or twice a week, in one to two grains till ten to twenty or more grains are given in all. But all the symptoms of poisoning should be watched for and the drug stopped as soon as any one of them appears. Rarely neuritis and optic atrophy may follow injudicious and prolonged use of this remedy.

If the case is a severe one with sleeplessness at bed time one may give a sleeping draught with fifteen to thirty grains each of potassium bromide and chloral hydrate. Paraldehyde in suitable doses may be of service.

13 Jour Amer Med Assoc (1932) Foreign letters Feb 5th p 150

14 Schom mico (1926) Jour of Immunology Sept p 209

In some cases medicinal in two to five grains with atropine in 1/100 gr at bed time may be of benefit

Glucose either intravenously or orally with or without spirit ammoniæ aromaticus may be given a trial

Psychotherapy Treatment by suggestion, persuasion, etc., will be of service in suitable cases. Some attacks of asthma may be purely psychogenic in origin and treatment by psychotherapy may be of value to them

Other allergic and allied conditions

Such groups of diseases like periodic or allergic coryza, urticaria, angioneurotic oedema, allergic gastro-intestinal disturbances, migraine, eczema, and many others demand management more or less in the above lines, modified according to indication and individual details.

CHAPTER XXXVIII

HAEMOPTYSIS

Diagnosis etc In hemoptysis the underlying cause should always be determined whenever possible. It is a symptom and not the disease, hence the treatment varies according to the underlying disease of which this is but one of the manifestations.

Amongst the common causes are pulmonary tuberculosis at its early congestive stage later due to erosion of blood vessels mitral stenosis, bronchiectasis ulcerations in the upper air passages trachea bronchus infarction, thrombosis new growths of lung trachea ruptures of aortic aneurysm etc, are common. Trauma injury fracture of ribs, abnormal blood conditions in septic etc lung flakes are rather uncommon conditions particularly the latter in India producing hemoptysis. In the tropics rupture of hepatic necrosis (amebic) through the lung may give rise to anchovy sauce coloured sputum and may simulate hemoptysis. Syphilis leprosy etc may rarely give rise to hemoptysis. Hysteresis is not uncommonly a cause.

Differentiation has got to be made from haematemesis. In hemoptysis the history points to lung disease the typical tickling sensation in the throat, salty taste of blood welling up in the mouth, and not uncommonly profuse in quantity scarlet red frothy, alkaline in reaction may or may not be mixed with sputum. Blood may be swallowed and confused with haematemesis.

Sometimes, even in frank and profuse hemoptysis, the diagnosis of bleeding from the throat, is made. This is a bad practice and should be discouraged. Blood from the throat may only show streaks in the sputum. Whenever there is suspicion all the diagnostic aids discussed under the head of tuberculosis of the lung should be taken recourse to. Not uncommonly cases of haemoptysis of early congestion in tuberculous subjects have been allowed to advance too far with the idea that the blood was coming from the throat, or was haematemesis from liver causes. One has seen at least three cases of frank hemoptysis ascribed to haematemesis from liver trouble.

TREATMENT

Investigation etc. In the treatment of haemoptysis one should not only try to stop the haemorrhage but also ward off subsequent complications which may prove more serious than the original disease giving rise to it.

Next one should proceed to ascertain the exact pathological process by inspection, palpation, auscultation and from the history of the case. As percussion may lead to further bleeding it is better not to practice it. The heart should be carefully examined to exclude any mitral valve disease, specially stenosis. Haemoptysis due to early congestion of pulmonary tuberculosis is rather difficult to diagnose as at this stage the signs and symptoms of the disease are generally silent. Sometimes the patient may feel from which side the blood is coming. Skiagram should be always taken and the sputum examined for full investigation.

Rest. Absolute rest in bed is the essence of treatment in all these conditions. In mitral disease, haemoptysis is generally beneficial and relieves and equalises the congestion in the lungs. Under these circumstances, other details of treatment of the cardiac condition should also be attended to. Recurrent haemoptysis due to bronchiectasis may ultimately require lobectomy. In milder cases besides rest in bed and some sedative in the form of bromides to relieve the excitement and fear of coughing up blood nothing more is required.

Assurance and good nursing. As these hemorrhages are seldom fatal, encouragement and assurance from the doctor that the condition is not serious may help much by restoring confidence. A cheerful nurse kept day and night is of considerable help in keeping the patient in his good spirit, otherwise the very sight and idea of coughing up blood are likely to make him extremely nervous leading to quickening of heart beat, rise of blood pressure and more of haemoptysis. If the patient is of a quiet temperament and is intelligent simple rest, a sedative mixture and reassurance from the physician is all that is generally required. Four hourly temperature charts, pulse rate etc., should always be recorded to see if there is a tuberculous basis and to assess the extent of underlying damage. In the milder cases such management is all that is required. But the danger of aspiration pneumonia or bronchopneumonia should be remembered and the patient encouraged to clear up the tubes by gentle efforts as here again straining may lead to further haemoptysis, so coughing, notably when vigorous, should always be forbidden.

The question of injection of morphine in $\frac{1}{6}$ gr doses with $\frac{1}{200}$ gr of atropine subcutaneously may have to be considered in

serious cases but the disadvantage is that it lowers the cough reflex hence the risk of production of pneumonia by the infected material already aspirated into other parts of the lungs etc is not inconsiderable. It is better to withhold injection of morphine in an average case unless very urgently required, though particularly indicated in nervous individuals. Nitroglycerine $\frac{1}{100}$ gr intramuscularly and repeated if required may be of use.

Diet During actual haemorrhage food should preferably be served as cooled milk and small portions at a time at the beginning. Not more than two pints of fluid in twenty four hours are to be granted. The diet should better be of milk and its preparations custard eggs, jellies, bread and butter, fish or chicken all served cool. But there are some observers who doubt the usefulness of serving food and drink cool.

Bowels should be opened by a dose of magnesium sulphate in two to four drams in the morning later, an enema on alternate days may be enough.

Calcium Calcium in suitable form and dose may be of some effect. Injections may not be essential but in urgent conditions calcium may have to be injected. Colloid calcium with vitamin D in dram doses orally thrice daily may be used. Calcium gluconate in five to ten grains with extract of thyroid $\frac{1}{10}$ gr and vitamin D in 200 to 500 units, thrice daily per month are found useful. Calciferol 1000 calcium tablets are some of the oral remedies used for such purposes thrice daily.

Rest the application of ice etc The patient should be in bed at least for three to four days after the temperature has come down to normal. Ice to suck may not always be good and should be discouraged entirely. An application of an ice bag on the infected chest with a piece of lint intervening may be useful specially for nervous patients. Ice sucking may be allowed to nervous patients if it is sucking. But sucking of ice by dilating the pulmonary vessels may cause harmful effects.

Bronchitis If bronchitis develops proper expectorant mixtures, inhalation of tincture I enz in compound, and rest in bed may be essential. Tuberculous cases may show bronchiectasis as a sequel.

and never allowed to exert himself. The room is better kept quiet, cool and no visitors allowed.

In persistent cases inhalation of amyl nitrite which lowers the blood pressure may be tried.

Other remedies One teaspoonful of sodium chloride given orally in half a cup of water, or intravenous injection of five to ten c cm or more, of a ten per cent solution of sodium chloride may do some good. It is said to act by drawing tissue fluids and thrombokinase etc into the blood and also by hypertonic effect reversing the osmosis for the time being. Concentrated glucose solution small quantity given intravenously may act in the same way and is coagulant.

Sodium Citrate Five to ten c cm intramuscularly or per vein of a four to ten per cent solution every twelve hours may be used with advantage. It acts by destroying blood platelets in the circulation.

*Congo red*³ ten c cm of one per cent solution given intravenously repeated every twelve to twenty four hours may be of service.

*Subcutaneous air*⁴ Injection of air subcutaneously between the two shoulder blades or at the inferior angle of the scapula at the level of the eighth to the eleventh rib in 200 to 400 c cm repeated on alternate days have been very successfully used by the present writer in about ten cases of intractable haemoptysis resisting all other forms of treatment including several injections of congo red. Care should be taken to see that the mediastinum is not displaced. An artificial pneumothorax apparatus may be utilised for this purpose or a big syringe may be useful too. The needle of such a syringe is introduced into the subcutaneous tissues and the empty syringe full of air is attached to the needle and the air injected subcutaneously. This is repeated till the desired amount is given.

Coagulants of Blood Blood coagulants like horse serum or bromostatic serum tissue extracts membranous coagulins etc may be injected in suitable doses, and repeated every six to twelve hours with good result.

In the absence of such preparations intramuscular injection of ten to twenty c cm of "hole human blood from one of the healthy nearest relation, may be given into the buttocks with some good. This may be repeated as required.

Artificial Pneumothorax When the side of the chest from which the haemoptysis is taking place is found out and the average treat-

³ Jour Amer Med Assoc (1935) October 12th p 1228

⁴ de Vega and D C Perez (1935) Singlo Medico Malin, April 2nd p 480

ment proves insufficient, or haemorrhage recurs, artificial pneumothorax appears to be the most reasonable line of treatment. In acute cases 300 to 400 c cm of air is required for the immediate relief. In a few hours' to two days' time a few hundred c cm more, may have to be repeated to increase the degree of collapse.

Results of treatment. It is very difficult to assess the value of different methods of treatment of haemoptysis, as not uncommonly it has a tendency to stop spontaneously. In fact, there is far less danger from bleeding than from subsequent spread of tuberculosis or development of broncho pneumonia.

Those in whom haemorrhage takes place by erosion of an artery in a big cavity, no known treatment, except probably artificial pneumothorax, is likely to do any good. If these lines of management prove ineffective, the patient may die within a few hours, and very little of the blood being expectorated out.

Mitral Stenosis. The cause of haemoptysis in mitral stenosis is, probably in a large percentage, due to pulmonary thrombosis, rather than passive venous congestion notably in the lung. The patient should be confined to bed. Digitalis in suitable doses prescribed, sodium citrate, orally in half a dram thrice daily, reducing the coagulability of blood, may be of use in cases of thrombosis.

Bronchiectasis. Skiagraphic examination of the lungs, notably by lipiodol injection, will help in the diagnosis. If the haemorrhage is from a cavity in one of the main bronchi, artificial pneumothorax may not prove effective as it may fail to effect a satisfactory collapse. In these cases lobectomy may have to be performed. The opinion of a surgeon well acquainted in these matters may be of help.

Commoner Diseases of the Gastro-intestinal System

CHAPTER XXXIX

PYORRHOEA ALVEOLARIS

General and Diagnosis.

Pyorrhoea alveolaris is a chronic general infection of the supporting tissues of the teeth, leading to their eventual destruction. A suitable, but not universally approved definition is general periodontitis (pyorrhœa alveolaris) is a chronic disease characterised by a progressive inflammation and ulceration commencing at the gum margin and invading the peri-odontal membrane, with the simultaneous destruction of that membrane. There is a rarefaction of the surrounding alveolar bone. As the supporting tissues of the teeth become destroyed, the latter become gradually looser. There is usually, though not invariably, a discharge of pus from the pockets formed by the erosion of the peri-odontal lining. Secondary changes of a necrotic character affect the cementum, dentine and pulp. In some cases the bone changes are of a progressive rarefactive character throughout, but in other cases rarefaction may be replaced or proceed side by side with sclerosis or production of bone and fibrosis of the gum, so that the teeth remain firmly implanted until a relatively late stage.¹

The exact causes of onset of this disease are though not very certain, yet conditions favouring the stagnation of food particles undoubtedly predispose to pyorrhœa alveolaris. Mouth breathing, irregularities of the teeth, dietary factors, mostly lack of some of the important vitamins such as C, probably A and D as well, spacing due to loss of teeth, defective fitting of crowns and ill-fitting plates, may singly or collectively favour the onset of the disease. Strangely enough, pyorrhœa occurs in patients in whom none of these factors are present, while conversely local conditions unfavourable to oral hygiene may be compatible with a good condition of the gums. It may be that there is some relation with this condition to the metabolism of the patient. Large saturations of the systemic fluids, as a result of endocrine imbalance, may favour the onset of pyorrhœa alveolaris, by deposition of tartar around the teeth, specially at whose base the buccal glands open.

Mouth, tonsils, teeth should be very carefully examined in every case. The infection often starts at those teeth where the ducts of the salivary glands open, hence it is in those teeth that one expects to find pyorrhœa commencing. Two lower central incisors and the first molars should be carefully examined in early cases. An electric torch, a wooden flat spatula, which can be burnt away subsequently after each examination are suitable for a thorough investi-

1 Bennett's 'Science and practice of Dental Surgery', (1931) 2nd Edition Vol 11 Chap 30

2 Pitts (1934) The modern treatment of pyorrhœa etc in Wakely's Modern treatment in general practice, p 169

gation In doubtful cases a proper skiagraphic examination of the teeth sockets and their apices may throw much light

Common Trouble with far reaching effects

It is of very common incidence Streptococci in the pus swallowed either alone or along with the chewed food material have their toxin partly neutralised and the bacteria attenuated by the hydrochloric acid secreted during the day time but at night when the secretion of the acid is much less specially during sleep they pass directly to the duodenum and creep up the bile ducts both of which may be infected causing chronic inflammation and gastro-duodenal ulcers cholecystitis stones etc In their victorious march the streptococci may produce whenever the conditions are favourable enteritis colitis appendicitis etc Chronic amoebiasis when associated with a chronic streptococcal infection of the gastro-intestinal tract is extremely difficult to treat specially to eradicate Foul breath tonsillitis, chronic pharyngitis and throat troubles are not uncommonly associated with pyorrhoea alveolaris Systemic dissemination³ of the bacteria may lead to many complications for the details of which the chapter on septicæmia should be seen

Absorption of toxins from these areas vary according to the local reaction and resistance of the patient some are able to form barriers in others chronic sub-infection and toxæmia lead to progressive anaemia and slight pyrexia Predispersed susceptibles may develop non specific infective arthritis commonly classed as rheumatoid arthritis fibro-mositis of various types such as lumbo-sacral neuritis arthritis etc specially these are quite common. Chronic eczema urticaria and other states of instability of the various systems of the body are not infrequent There are digestive disturbances metabolism is affected as is shown by the improvement of diabetes mellitus and gout when pyorrhœa alveolaris in the patient is properly managed The big sympathetic area namely the splanchnic region being in a state of sub-infection the patient usually shows variable degrees of neurasthenia and mental imbalance accompanied with some grade of peevishness The mental outlook is not uncomonly pessimistic and narrow If carefully examined one almost invariably finds in these cases a painful gall bladder and a cæcum which is uncomfortable if not tender on pressure There are numerous other minor complications which result from the chronic septic processes enumerated above This condition is discussed in such detail because of the far reaching ramifications of serious type caused by this apparently trifling and often uncared for serious but common disease which is a prolific source of very slow, sometimes imperceptible undermining of the health of an individual

TREATMENT

Since the destruction of the peri odontal membrane and the bone around constitutes the essential lesion in this disease complete cure which means reformation of bone and a re attachment of the peri odontal fibres is not likely But the utmost, one can get done in these cases is to try to arrest the process But when an initial gingivitis precedes the attack of pyorrhœa proper treatment as indicated by this inflammation may do much, but unfortunately not always very happy results follow treatment even at this early stage

MECHANICAL

Removal of the tartar

The teeth should be scaled thoroughly, specially the portions hidden under the gum margins, unless this is done the results of treatment are as a rule unsatisfactory. To get effective scaling a mere removal of the obvious masses of tartar followed by polishing of the teeth are useless. No places should be left where pus and the bacteria may remain hidden.

MASSAGE OF THE GUMS

This may conveniently be done by the fingers, viz., the thumb and the forefinger. A piece of muslin wrapped round the index finger, and soaked in a solution containing about ten to twenty grains of tannic acid in an ounce of glycerine serves this purpose very well. The gums should be vigorously rubbed, both transversely and vertically and on both the surfaces inner and outer. This should be repeated twice a day for a few minutes each time. After about three weeks' treatment by massaging with tanno glycerine, one may change to one containing one tea spoonful of salt in a tumbler of water. This solution should be used by the patient for the rest of his life in massaging the gums twice daily, early in the morning and the last thing at night. It acts by producing better local circulation and promotes fibrosis of the gum-margins. It is sometimes surprisingly quick in its beneficial effects. In an average case in two to three weeks time the tendency to bleeding ceases, the tenderness becomes less, the gums lose their dark congested appearance, and the teeth may even be somewhat firmly set. Those who want to keep their teeth firm and healthy should always practise this, besides brushing and following the other details.

Mouth washes etc

The teeth should be brushed clean with a hard tooth brush and some suitable paste or soft soap. The brush has the advantage that it reaches the inner crevices of the teeth, which the indigenous stick brushes (Dáton) cannot always accomplish. Gargling the mouth with one in five solution of hydrogen peroxide in water, specially before retiring to bed may cleanse the pockets of pus. In bad cases specially where there is sepsis present, after brushing thoroughly, a four percent solution of mercurochrome in distilled water may be carefully applied to the teeth by a swab with benefit.

Numerous solutions, pastes and washes have been advertised and advocated from time immemorial, but they have not stood the test of time. Only proper cleansing and the application locally of a dependable antiseptic are all that are required besides the above indicated lines. If there is pain in the teeth one may apply a local application like the following:

Tincture Aconite	m 120
Tincture Myrrh	m 120
Creosote	m 30
Liquor Iodine	ad fl oz 1

to apply to the teeth as directed

In cases where mercurochrome solution is not available, equal parts of rectified spirit and tincture iodine may be applied to the teeth with some result. Though there is a group of dentists who are against the idea of applying iodine to the teeth. While applying these antiseptic solutions, an ordinary swab is quite suitable, but for proper application to the upper set the patient should better lie down, otherwise the antiseptic lotion does not infiltrate effectively, to the roots the affected parts of the teeth. Diluted tincture of iodine is a little painful and often gives smarting to the gums, whereas mercurochrome solution is painless.

If there is frequent bleeding and the teeth not very strong, after cleansing by brush etc and massage of the gums, one may gargle the mouth with a twenty five per cent solution of alum. When there is foul breath due to pyorrhœa the mouth may have to be cleansed several times a day. Listerine, pasturine etc are proprietary mouth washes which give a sense of cleanliness to the mouth. But the essence of all this is to keep the teeth clean, and try to render the gums as free from the pathogenic microbes as possible by the local application of some dependable but non corrosive antiseptic solution. Alkaline mouth wash at bed time is of use when the oral secretion is acid. Milk of magnesia is advocated by some for this purpose.

Vaccine therapy

This is of more use in cases where some symptoms of toxic absorption such as arthritis, neuritis etc are present. Intestinal symptoms may show amelioration when an auto vaccine from the pus obtained in the gums, combined with the intestinal streptococci is used. But not uncommonly milk protein or stock vaccines or other protein shock therapy may be of some effect. How far beneficial local action may be produced by vaccine therapy is doubtful.

Extraction

To decide which of the teeth need extraction, one should see the amount and nature of destruction of bone around, by clinical and radiographic examination of the affected area. Apical abscess, or marked periodontitis with pus formation and other similar irrecoverably damaged states, indicate extraction. The opinion of a competent dentist is useful for these purposes. But there appears a general tendency to extract the teeth without very sufficient justification.

General measures

Unless a whole hearted co operation of the patient is there, the best efforts of the doctor will be of no use. The cleansing, massage, mouth washes, local application of the antiseptics are often neglected as the condition improves, with the result, that the patient in his next visit is in a much worse and sometimes in an incurable or very difficult situation from the standpoint of the doctor.

It is sometimes paying, specially in the long run to make the patient understand that pyorrhœa alvfolaris is a chronic intractable infection which unless very persistently and vigilantly treated and cared for, during the rest of his life, there is not much good effect expected out of treatment. This is a condition in which it is very easy to bring about some improvement but it is extremely difficult, unless the patient co-operates and is alert, to maintain this for any length of time.

No stone should be left unturned to improve the general standard of health of the subject, who is not infrequently constipated and lives on an unbalanced dietary. Vitaminous diet or suitable tonics, iron, arsenic, mercury etc may be of use in these directions. A C and D vitamins should be adequate in his daily diet. The bowels should be regulated preferably by fruits, or vegetable laxatives like "trifolia" water, basil or papita etc. Physical exercise in the open air, proper chewing of the food, washing the mouth and cleansing the teeth after each big meal, specially before retiring to bed are good practices which every person should be made to acquire from childhood, and this may prevent much of ill health and miseries of after life. Taking of plenty of fresh fruits, eggs and milk appear in actual life to be good preventive of pyorrhœa and decay of the teeth.

Surgical treatment Various sorts are of use, gingivectomy and excision of pockets of pus are simple but reflection of the gum and curetage of bone are rather elaborate operations.

Electrical measures, such as zinc chloride or iodine ionisation have been advocated. It should be done by those who are well versed in giving this form of treatment.

Careful cleansing of the teeth by brush etc specially before going to bed at night, regular massage of gums, twice a day, chewing of fruits after carbohydrate meals, plenty of fresh fruits, egg, milk, butter, that is, a diet containing abundance of A, C and D vitamins avoidance of constipation and so on are probably preventive to this condition. Caries of teeth, mouth breathing etc should also be rectified.

CHAPTER XL

STOMATITIS

General These are particularly common in debilitated ill nourished children reared more or less under unhygienic conditions sometimes on unsuitable dietary During dentition acute specific fevers these oral troubles usually first appear There is almost invariably associated with it some gastro-intestinal disturbance Rarely adults who are debilitated due to any cause may be affected

Catarrhal or Simple and aphthous Stomatitis They may be considered together The buccal mucosa may partly or completely be involved It looks red and swollen sometimes even angry looking The patient refuses hot or acid food or drink There is usually an excess of secretion in contrast to the dry mouth of thrush

TREATMENT

All care and attention should be given to proper oral hygiene The teeth, tonsils and the gastro intestinal system require proper management The underlying cause of debility such as *improper diet, atlaminoisis enteritis, acute infections, and such other factors*, should be properly remedied In adults excess of alcohol and tobacco should be stopped In cases of constipation or diarrhoea an effective morning dose of oil ricini may be useful The mouth, if very sore should be cleansed every few hours specially after each feed, by a swab dipped in boro glycerine A two to four per cent glycerine solution of potassium chlorate may be applied locally every two to four hours In aphthous variety a thorough initial cleansing by either hydrogen peroxide or five to ten per cent solution of collargol in aqua distillata may be required These initial cleansing applications are of value in cases of much pain indicating very acute inflammation

Orally one may give the following in tea spoonful doses to young patients thrice or four times a day after food with good result

Potassium Chlorate gr $\frac{1}{2}$ to 1

Syrup Auranti ad m 60

If there are spirochetes in abundance in the aphthous form some workers advocate local application by a swab of 0.3 g of neosalvarsan solution in 2 c cm of aqua distil, or one per cent solution of copper sulphate in glycerine Small doses of pulv rhei and sodii bicarb with nux vomica may be useful by improving appetite and promoting assimilation, thus raising the systemic defence

Thrush Unclean feeding bottles may initiate this infection caused by *candidum albicans* notably in debilitated under nourished children The nurse

or the mother may mistake the small pearl white patches on the tongue and on the mucosa of the buccal cavity as curdled bits of milk, but when they coalesce and form into patches, or when the superficial membranes get detached, frank ulcers may appear. They may spread down the oesophagus.

TREATMENT

The mouth should be kept clean, notably after each feed by boro glycerine or some other suitable non irritating mild antiseptic. The feeding bottles should be kept clean and sterilised by boiling and immersed under previously boiled water and well covered. The general health of the child should be improved by high protein and vitamin rich diet such as fresh fruit juice, eggs, butter, oil etc. Open air life is good. Iron, arsenic, nux vomica, etc., may prove of some effect. Before starting treatment the mouth might have to be cleansed even under a general anaesthesia, notably in very painful states. An application like the following may be used very liberally with some good

Sodium perborate	gr 60
Glycerine	ad one fl oz

Some workers think potassium chlorate in half to two grains orally thrice daily, to be specific and worth a trial.

Gangrenous or Severe forms of Stomatitis—often called **Cancrum Oris**. Subjects are young persons children or adults debilitated through various causes of which Kala azar, measles, splenomegaly are common. It starts by producing necrosis of a small area, which spreads rapidly. The mischief goes on usually inside the cheek, the outer skin looks red swollen hyperaemic. The centre of the affected area becomes black and if not properly treated may gradually slough out leading in case the patient survives an attack to hideous scars. Toxic symptoms such as fever, pain, restlessness, quick pulse etc. are common. Anaemia and leucopenia are often characterised by their presence and may be pronounced.

TREATMENT

This should be energetic and prompt. The disease is treated both by improvement of the systemic resistance and also by local antiseptic measures. Locally gargles of Condyl's lotion and touching the parts with carbolic acid on a swab though have been advocated yet in most of the cases gargling of mild antiseptic or oxidising lotions like Condyl's, potassium chlorate solution or Listerine and such like preparations with methodical treatment to raise the general standard of health has done good in the majority of cases. The improved resistance is of greater value than the local treatment.

Diet At the painful state, it should mainly consist of milk, enriched by butter or beaten eggs. Fruit juice, eggs may be useful to raise the systemic resistance. Suitable iron rich vitaminous tonics may be of value. Iron, arsenic, nux vomica, regular bowel movement, proper protein and vitamin rich diet are definitely useful. If there is

much anæmia injection of some dependable brand of liver extract in conjunction with oral use of iron, and dilute hydrochloric acid often do much good. In leukopenia, injection of nuclein solution, better still pent nucleotide may be useful. When associated with kala azar, which made such an overwhelming local infection possible, should be energetically treated by intensive course of pentavalent antimony compounds, along with the general measures to improve the health of the patient. Most of the cases we have treated by average local gargles washes coupled with energetic systematic measures for the improvement of the general health in the lines indicated above with good effect. Probably no where more than in the treatment of cancrum oris one needs bear in mind that, it is on the raised systemic resistance of the patient, that we have to depend for a cure.

CHAPTER XLI

HYPER CHLORHYDRIA, AND ACHLORHYDRIA

HYPER CHLORHYDRIA

Cause etc The commonest causes are habitual over-eating, insufficient mastication specially of raw or irritating foods or fruits, abuse of tea, tobacco or alcohol. Too big carbohydrate meals by irritation of the stomach may also induce this secretory abnormality.

Hyper secretion is also common in duodenal ulcer or prepyloric ulcer. But in duodenal ulcer² not only there is heart burn but there is actual pain after food and comes at regular hours, tenderness is usually constant. There is hypertonus³ and quick emptying in duodenal ulcer. In early stages of cholelithiasis and appendicitis hypersecretion is not uncommon too.

The main symptoms are heart burn that is burning sensation in the oesophagus often associated with a similar sensation behind the sternum. There is almost as a rule regurgitation into the pharynx of a small quantity of scalding sour fluid. Usually the sensation begins two to three hours after meals and is relieved by alkalies water or food. Vomiting of a little intensely sour bitterish fluid may relieve the condition. The appetite is generally good but constipation is almost the rule. Often there is excessive salivation in some cases.

Diagnosis

Examination of test meal is one of the safe means of diagnosis from gastric or duodenal ulcer gall stones and chronic appendicitis before regarding it as uncomplicated secretory hyperfunction.

TREATMENT

Treatment should consist first in removing the exciting factor

1 Upperly (1936) Lancet 1 p 5

2 Kark and Davis (1936) Guy's Hosp Rep 86 p 497

3 Canpell and Constance (1924) Ibid 74 p 303

wherever possible and proper neutralisation of the hyper acid state of the stomach contents

For the second purpose, fats which tend to inhibit gastric secretion should be given, proteins whose combining power with hydrochloric acid is well known, should also be included in the dietary. Carbohydrates stimulate acid secretion and hence should be allowed as little as possible. The most important articles of diet are, milk, cream, butter, cheese, chicken meat, fish, eggs etc. Olive oil is a good remedy to neutralise this hyper acidity. But milk is a good natural antacid.

Meat extracts, pickles, vinegar, unripe fruits, mustard hot and spicy preparations effervescent drinks, alcohol abuse of tea, tobacco etc., should always be either avoided or taken in great moderation. A powder like the following acts as an antacid. The action is through its various ingredients

Pulv creta aromaticus	gr 60
Bismuth oxycarbonate	gr 60
Ext Belladonna Sicum	gr 4
Potassium Bromide	gr 60
Magnesium Carbonatis Ponderosus ad oz 1	

one level tea spoonful when the heart burn is unpleasant or painful, but this should not be taken too frequently. The laxative effects of the magnesium carb ponderosus besides its antacid properties make this prescription of use notably because constipation not uncommonly is one of the major factors in giving rise to this improper secretory activity. In milder cases olive oil in half to one table spoonful at the height of the pain or heart burn and a dose of a mixture containing tincture belladonna in six potassium bromide gr ten so in adult men do some good by inhibiting the gastric hyper secretion. For the details the chapter on gastro duodenal ulcers may be seen.

General Measures The patient should chew his food well. The abdomen needs be protected from getting chilled. Cold fect or sensation of cold on the skin may aggravate this condition by reflex secretion. Constipation is an exciting factor and should, always be avoided by either simple laxatives like "trifoli water" better milk of magnesia etc. Over eating, improper diet, are bad. Hurry or excitement during or after meals is injurious and should always be avoided. After meals the patient should, wherever possible rest in his bed on the right side for a few minutes to an hour.

Further investigation If the above lines of treatment do not improve matters sigmoidic investigation of the gastroduodenal tract is imperative. Fractional test meal also should be done to see the real

state of affairs underlying and to ascertain the type of the hypersecretion. Regular washing out of the stomach with one pint of one percent sodium bicarbonate solution may be useful.

HYPOCHLORHYDRIA OR ACHLORHYDRIA

Relative or absolute deficiency of hydrochloric acid is common, particularly the former. Oliver and Wilkinson (1933)⁴ and others⁵ bring out the following facts after reviewing the subject.

(1) Achlorhydria may occur in apparently healthy persons, but is rare in them when are completely healthy.

(2) More common in women than in men.

(3) May be the fore runner of ailments to be developed later on, such as cancer etc.

(4) Achylia gastrica which means complete absence of all gastric secretions in contradistinction to achlorhydria is rare except in cases of pernicious anaemia.

(5) Though commoner in later life, children may inherit the tendency of achlorhydria from parents.

(6) Common in debilitating conditions such as tuberculosis, chronic colitis, malaria also with functional neurasthenia fatulence bowel irregularity, debility slight anaemia disturbances of the tongue. In organic diseases of the gastro-intestinal tract like chronic gastritis, gastric or intestinal cancer, colitis dysentery etc.

(7) Severe pain resembling that of ulcer of the stomach may be due to achlorhydria.

(8) It is common in cholecystitis and liver diseases.

(9) Very common in pernicious anaemia, though there is doubt if this occurs at all in coloured people.

(10) In hyper and hypothyroidism diabetes mellitus, it is common too.

(11) Very frequent in subjects of rheumatoid arthritis, specially who show diarrhoea glossitis and anaemia.

(12) Pretty frequent in allergic diseases like asthma migraine, urticaria dermatoses psoriasis, chronic skin diseases, and suppurative process.

Nipper and his co-workers⁶ (1938) working in the hospital for Tropical Diseases Calcutta find that achlorhydria is not so common in Indians as is supposed. He concludes that the current belief that compared with Europeans the Indians have less hydrochloric acid secretion is not justified by experimental data. In a group, they find Europeans, Bengalis Punjabis are in order of the grade of acid secretory activity. All the Bengalis were mainly rice eaters. They think achlorhydria to be less in comparison with that encountered in Europe and America. Women are more commonly affected. Anaemia shows achlorhydria as in other countries.

⁴ Quart Jour of Med (1933) 2 July p 431

⁵ Medical Annual (1933 and 1935) Achlorhydria

⁶ Ind Med Gaz (1938) Feb p 65

TREATMENT

The above long list appears puzzling. But in actual practice one has found that the big list is quite justifiable, specially when one thinks of the good results in a small percentage and fair result in a good percentage of the above cases, derived by giving suitable doses of acid per mouth.

The treatment consists in exhibiting the following remedies in the way directed

Glycerinum acid Pepsin	fl oz	3
Acid hydrochloric dilute	ad fl oz	4

One teaspoonful in a feeding cupful of water in sips after or before the principal meals. The associated anaemia demands treatment by big doses of iron and other remedies discussed under the anaemias.

On actual experience one may suggest that acid treatment of the gastro intestinal tract for all conditions of debility is likely to be rewarded as a rule by gratifying results, and is always worth a trial, specially if there is any associated anaemia.

CHAPTER XLII

NERVOUS DYSPEPSIA

(Gastro Intestinal Neuroses)

There are many nervous and neuropathic people mostly females¹ who pay far too much attention to slight discomforts associated with the digestive process and develop fear of disease and obsessions about the effects of various articles of diet. A psycho-neurotic^{2,3} basis on which gastro-intestinal symptoms are easily grafted may be hereditary or acquired. They not uncommonly scrutinise their excreta and make fuss without reasons. They often complain of discomfort flatulence and lack of appetite.⁴ Such patients will complain of most easily digestible foods not agreeing with them. They generally show tachycardia clammy hands and feet. In the more neurotic persons, there may be nervous vomits aerophagia regurgitation of stomach contents etc. It is imperative that all other organic diseased conditions should be excluded by a thorough and impressive physical examination before they may be labelled as functional. Radiographic investigation examination of stool for parasitic and protozoal infections, testmeal, blood examination to exclude anaemia and achlorhydria are also important.

1 Ryle, (1936) Lancet, ii, p 893

2 McInnes, (1937) Proc Roy Soc Med 30 p 893

3 Morgan, (1931) Functional disorder of the gastro intestinal etc Lippincott Phila pp 250

4 Brown and others, (1932) Anorexia Nervosa, London, Daniel pp 61

Treatment This consists in modifying the somatic nervous basis. Dietetically it is better to start initially with small quantities of milk every two hours, no other food being allowed in between, then gradually full diet is reached by a slow building up process. During this time proper psychotherapy and re education are to be taken resort to also. After a very careful and scrutinising study of the patient, including skiagraphic examination, the doctor should explain things frankly to him. One should assure the patient that his fears are unfounded. The importance of the improvement of general health, and a hygienic living should be impressed upon. Such reassurances are important and may have to be repeated frequently.

As most of these subjects are under-nourished, the general standard of health needs be raised by proper diet, exercise and rest.

The following appear important

(1) Correction of the imbalanced diet. Fats, proteins and carbohydrates in proper proportions, with adequate amounts of vitamins, fruits, milk, egg, whole meal bread, butter, fresh fish and good meat are of value. If there is much gas formation or putrefaction, sour milk, 'Dahi', lactic acid Lactilli may prove useful. (2) Rest, both mental and physical after each meal, lying on the right side for some time, say an hour to half an hour may be of advantage. (3) The food should be chewed well and time taken over meals. Quick eating is often rewarded by dyspepsia and indigestion. The stomach should never be allowed to be overfilled. (4) The patient should be induced to take some physical exercise, walking, swimming, deep breathing with massage, specially of the abdominal muscles, to increase their tone and thus avoid constipation, are of service. For relief of constipation ordinary 'trifolia' water 'ispaghula' or in bad cases a prescription like the following may be of some good.

1 fl. dr. cascara sagrada	m	60
Tincture Belladonna	m	5
Potassium Bromide	gr.	10
Syrup Auranti	m	60
Aqua chloroformi	ad fl	oz 1

one dose twice or thrice daily. Remedies of use are belladonna, bromide, and cascara group. Some dilute hydrochloric acid and pepsin for protein indigestion is mentioned under achlorhydria, and five to ten grs each of taka diastase, pancreatin and lactopeptin after meals in cases of carbohydrate dyspepsia may be of use.

Though achylia gastrica⁵ is rare yet achlorhydria is not uncommon and acid and pepsin after food is of value under these circumstances. There may be associated with such achlorhydria, chronic gastritis,

anaemia infections, neoplasms diseases of the biliary passages and treatment of these conditions is essential to bring about a complete cure. Big doses of ferri et ammon citrate followed, after meals, by acid or ptycreatin combination may be of greater efficacy in cases showing anaemia, than these digestive drugs given without iron. Injections of liver extract may be of service in refractory cases of anaemia.

OTHER FORMS OF DYSPEPSIA

There are numerous other forms of dyspepsia and they may require different lines of treatment. But in short the above lines of management with required modification to suit the circumstances are all required. But one should bear in mind while treating these cases the fact that now a days we do not 'catch our rabbit to eat the stew.' There are paid men or ladies in the household doing their maximum to satisfy only the tongue, not uncommonly at the expense of the interest of the whole of the gastro intestinal tract. Acidity heartburn, dyspepsia constipation etc are common. One should try to take lesson from the life of the animals who live freely in the open air under natural conditions. They have got to catch their prey in order to devour it. The importance of physical exercise is no where more forcibly impressed as is done by the examples of the wild animals. They suffer seldom from dyspepsia, because they work much and eat less.

Mental and diet. Importance of a change of surroundings and that to be more effective to a more cheerful bracing place may improve dyspepsia materially. The quality and the balancing of the diet also are of importance too. Animal proteins are far easily digested than carbohydrates and fats. Vitamins should also be properly shared by these patients. B vitamin is said to be of special use.

In anorexia nervosa: the best treatmet consists in explanation reassurance and firmness. Recently insulin injections⁶ to cause a craving for food are being given with promising results.

CHAPTER XLIII

GASTRITIS, ACUTE & CHRONIC

The signs and symptoms vary from a mild acute catarrh to a severe purulent or phlegmonous gastritis¹. The most frequent causes are iatrogenic errors on the one hand and toxic or infectious conditions febrile or afebrile on the

⁶ Blotner (1934) New Eng Jour Med 211 July 19 p 103

⁷ Pitfield (1935) Med Record 141 April 3 p 379

¹ Lukens (1933) Jour Clin Investigation 12 p 181-192

other than acute general infections cholecystitis appendicitis gastric crisis of tales or an attack of angina pectoris or coronary thrombosis it may simulate an attack of acute gastritis. The recent idea as to the relation of pernicious anaemia cancer² to gastritis is coming into prominence. Gastroscopy³ as a means of diagnosis is now more commonly used than before. Skingram test meal and other examinations are more advantageously employed for chronic states than for the acute condition.

TREATMENT OF ACUTE CASES

In acute gastritis with temperature or when in association with acute infections the patient should be confined to bed warmth and a fnder applied on the abdomen. One of the natural curative agents is emesis and is only an effort to get rid of the deleterious products from the stomach. If emesis is likely to do good the patient may be given a pint of warm saline with a dram of sodium bicarbonate in it to be drunk off and this generally promotes vomiting. When there is much congestion and pain in the stomach after emesis, the patient may be given a stomach wash with ten grains of zinc sulphate in one pint of saline. When there is also involvement of the intestines as indicated by pain, griping and discomfort over the abdomen an ounce of castor oil repeated as indicated may improve matters by clearing the gut of the irritant materials specially in cases of food poisoning and so on. In bad cases with intense pain etc., morphine and atropine in 1/4 and 1/100 to 1/200 gr respectively, more or less according to indication may have to be given. Fupaco or eukodal tablets may be useful in relieving the pain. The patient should be asked to give complete rest to the stomach for one to two days and take only small sips of water, barley water or other warm non irritating drinks. Even lemonades, cold drinks etc. may increase irritation and delay the recovery. Once the acute stage is over milk diluted with barley water or some such cereal water, sipped when warm may be soothing. Orally chlorodyne in ten to thirty drops or tincture of opium in two to five drops may be of use when the pain and discomfort is pronounced. But these analgesics which tend to cause constipation should preferably be given after the gut is cleared out of the irritants by either a preliminary dose of castor oil or mild saline purge.

On the second or third day, gruel, milk, soft egg and toast may be permitted, and a few days later a normal diet consisting of soft rice and ordinary curry of live fishes without spices and fat may be added. Hot and irritating food should be avoided as far as possible, even after recovery. The factors which induced an attack should be remedied.

² Tait (1936) Medical Annual p 211.

³ Bored et al (1935) New Eng Jour Med Blot & 212 March 11 p 463.

⁴ Schindler Ortmaier & Benshaw (1937) Jour Amer Med Assoc Feb 6 p 466.

CHRONIC GASTRITIS

Chronic In the treatment of chronic gastritis the most important item consists in avoiding those irritants which gave rise to the trouble. This may be due to abuse of tea, tobacco, alcohol, oral sepsis and *morbillia rheolitis*, irritation of food and so on, which should demand a thorough investigation in view of proper treatment. Change to a better, dry, milder climate from a too hot or cold one may be of use. The bowels should always be kept well regulated.

Diet All irritants either mechanical, thermal or chemical should be carefully avoided. In the chronic stage non-irritating bland articles of food should be taken and chewed well. Coarse particles too cold or hot, highly spiced or fried or too sweet articles are to be avoided. In cases of gastritis due to portal congestion blue will at night followed by enemas in the morning are of use.

In bad cases with hyper acidity the following mixture may be effective:

Liq calcis Saccharatus				
Liq Bismuth et ammon	ta m	60		
Tr Rhei Co	m	30		
Syrup Auranti	m	60		
Tr Card Co	m	10		
Aqua Chloroformi	1d fl oz	1		

one tablespoonful before or after each meal

In cases where there is deficiency of hydrochloric acid as is expected in chronic cases a mixture containing fifteen minims of acid hydrochloric dilute with the rest of glycerinum acid pepsini up to one dram diluted in a cup of water in sips after the two principal meals may help materially. In carbohydrate indigestion five to ten grains each of pancreatin, lactopeptin and takadiastase after meals may do some good.

If there is too much of mucus in the stomach as shown by excess of it in the vomited material or by test meal, washing the stomach with weak solution of sodium bicarbonate, say one tea spoonful to a pint of warm normal saline or one to two tea spoonfuls of hydrogen peroxide to a pint of normal saline may be utilised for the lavage or washout of the stomach once a day before breakfast, with good results. Using this the patient may be made to drink a glass of warm water with a pinch of sodium bicarbonate in it. This when vomited out automatically washes out the stomach.

Cold chilling The abdomen should be kept covered by some suitable covering material, because local chilling is bad for acute as well as chronic gastritis.

Constipation should always be avoided by suitable laxatives of which castor oil is one of the best. Strong or irritant purgatives are not suitable.

CHAPTER XLIV

GASTRIC AND DUODENAL ULCER

It appears that these conditions are more frequent now in Bengal at least than they were about a decade or so back. Whether it has got any relation to increased hurry and bustle of modern life and its associated constipation poverty, improper dietaries, avitaminosis, greater worries, diarrhoea and infections one cannot say surely but that they do play some part in the greater incidence of these pathological processes there is hardly any doubt but how far a part these individually play none can say yet.

These ulcers are more common in both the sexes between the ages of twenty to forty years¹. Duodenal ulcers are about three times more frequent in comparison with gastric ones. Here is given some of the important diagnostic points of differentiation². But they are not absolute and may vary a little from person to person.

GASTRIC ULCER

- 1 Pain starts usually immediately to 1 Usually follows an hour to three hours or more after meals
- 2 Food intake increases the pain may 2 Food may give some relief at least for the time being. Empty stomach causes much pain or burning hence called hunger pain
- 3 Vomits are common and relieve the 3 Not so common even may be rare. Do not relieve nor do alkalis lessen the pain much
- 4 Haematemesis is more common 4 Melena is more common
- 5 Frequently the point of maximum 5 The point of maximum tenderness is more or less fixed and at ut half an inch to the right of a point midway between the xyphoid-process and umbilicus—the usual position of the first portion of the duodenum
- 6 Complete freedom from symptoms 6 Common
- 7 Test-meal shows usually hypochlor hydria and the other usual characteristic findings 7 Usually found hyperchlorhydria is noted and the steep acid curve etc
- 8 Radiological findings may show the 8 May show deformed and irregular duodenal cap which may be tender Residue in ulcer crater. The normal duodenal cap is like a helmet. The stomach is usually hypermotile and quickly empties itself

¹ Balfour, (1933) Canad Med Assoc Jour 24 p 27

² Hurst and Stewart, (1929) Gastric and duodenal ulcers Oxford press pp 544 N York

The most constant symptoms in both these conditions are enumerated above but besides there may be gaseous eructations nausea heart burn constipation and others Sepsis in the teeth tonsils gall bladder appendix lungs or in other sites may be found in association and are the important contributory factors In duodenal and prepyloric ulcers fractional test meal shows acid curves of a climbing type Occult blood encountered repeatedly in the stools on a proper dietary and when bleeding from teeth gum etc are excluded in the absence of cancer is highly suggestive of active ulcer specially when other signs and symptoms are present There may be the characteristic angiographic findings³ Recently flexible gastrosopes⁴ are being used extensively to visualize these ulcers but their uses are not without dangers unless done by experts in the line There is some experimental work on the production of ulcers by oral exhibition of acids and other substances⁵ Blood deficient in C vitamin probably predisposes to the production of these ulcers⁶ Over the diathesis we have very little control

The commoner complications of gastroduodenal ulcers are haemorrhage perforation localised or subdiaphragmatic abscess perigastric or periulcerous pyloric obstruction hour glass stomach rarely cancer and others

In discussing the differential diagnosis one should think of cancer stomach chronic gastritis gall stones cholecystitis chronic appendicitis specially with a high appendix, renal calculus gastric crisis of tabes, gastric neurosis and others

TREATMENT

As soon as the diagnosis is made, the patient should be made to rest in bed for at least four weeks He should avoid cold and chills and keep himself warm, but may be allowed to be up and about for bathing and answering the calls of nature

The principles of treatment are to lessen the excitability of the stomach, to reduce its spasms, to lessen and neutralise the hyper acidity specially at night, to reduce the hyper secretion, to relieve the pain and other complications as they arise Removal or remedy of the actual exciting factors such as irregular meals, constipation, unsuitable diet, night keeping, undue hurry at meals, too hot or cold food or drink, irritants, abuse of tea, tobacco, alcohol etc, and last but the most important, the septic foci, hidden or apparent

There are numerous methods of treatment evolved by different workers from time to time, only the few important ones will be referred to, here Most of them have the disadvantage of being too fussy and often unpracticable for an average Indian home and means

Von Leube Treatment After a haemorrhage has ceased the plan of treatment laid down by Von Leube is good In short, it is this First, the skin of the patient's abdomen should be washed out with soap

³ Buckstein (1930) Peptic ulcer, clinical roentgenology Heber 1 N York 33rd p p

⁴ Schindler (1935) Jour Amer Med Assoc 105 p 352

⁵ Friedenwald Feldman and Morrison (1933) Jour Expt Med 57 p 203-213

⁶ Smith and Mc Conkey, (1933) Arch Int Med 51 p 413-426

and warm water, bathed with warm sterile water, then by alcohol, and finally by one in five thousand hydrazine perchloride solution. A linen covered with five to ten per cent boric acid ointment is placed over the abdomen and warm poultices applied over it day and night every fifteen minutes. The linen of boric ointment should be changed daily, and the cleansing and sterilising bath repeated.

This treatment is rather difficult to follow practically so rigidly because of its numerous details. Instead of poultices repeated every fifteen minutes they are given every two to four hourly and kept warm by oiled silk covered with big pads of cotton wool or by electric thermopad where available. The poultice contains generally one third flax seed meal and two thirds bran. The bowels are to be kept open by mild saline purgatives.

The effects of this treatment is the prompt relief of pain, pyrolic spasm and hyper secretion. Healing is accelerated. Boas found that application of warmth promoted vasodilatation hastening recovery.

Diet granted in Von Leube treatment was four to eight ounces of boiled milk five times a day. Gradually by the fourth to the sixth day were added gruel, sago, rice, later on, eggs soft boiled, butter, olive oil, cream etc.

Lenhart's treatment

His principles in contrast with those of most other clinicians, consist in upkeeping the nutrition and strength of the individual. Thus he starts with feeding of milk and egg beaten together soon after the haemorrhage is over. He gives frequent feeds of the above diet and uses bismuth subnitrate as the antacid. Complete rest in bed for four weeks is enjoined, and an ice cap applied over the stomach for about a fortnight after the haemorrhage. Gradually solids, such as soft boiled eggs, soft rice, smashed boiled potatoes are added. Fats are useful and given according to indications.

Sippy's treatment and its modification. Consists in giving three ounces of a mixture of equal parts of milk and cream from 7 A.M. to 7 P.M. at hourly intervals. After one or two days, a soft boiled egg with a cream craker biscuit, or bread and butter may be added to one of the forenoon feedings, thus gradually soft boiled rice, oatmeal porridge, one or two soft boiled eggs, one at a time a few ounces of cereal say two to four ounces at a time, twice daily for the first few days to be made more frequent later on, are permitted.

A powder is given consisting of ten grs each of heavy calcined magnesia, and sodium bicarbonate, alternating with a powder containing ten grs of calcium carbonate and thirty grains of sodium bicarbonate in between the alternate feeds. After the last meal at night, every half

⁷ Sippy, (1915) Jour Amer Med Assoc 61 1, p 625.

in hour or so, for four to five doses of these powders are given until the stomach contains no food as is ascertained by occasional passage of the evacuator. Calcined magnesia and calcium carbonate have four, and two and a half times antacid properties respectively, as compared with that of sodium bicarbonate. Belladonna, olive oil etc., are used too.

But the recent ideas seem to show that too great proportion of sodium bicarbonate in these powders is not suitable due to its stimulating after effect on the secretions of the gastric mucosa. Not only that too much sodium ions when absorbed probably tend to cause increased acidity. This point will be discussed again later on. Oxide of magnesia has got about four times its neutralising property as compared with that of sodium bicarbonate. Some of the patent antacids are, Keylene neutralon, alocol etc.

Practically All these methods have got their respective advantages and disadvantages alike. But for an average case the following modified method adopted by the writer have been found useful and suitable for employment in average Indian homes as well as the hospitals. It is less fussy and somewhat practical.

The actual process The patient should be put to bed and the abdomen kept warm and chilling prevented by a simple binder of flannel or jute flannel, or thick linen or sheet of cloth. Unless he is in a very bad condition or just after a severe haemorrhage, he may be allowed to go for his normal toilet etc.

He is given a powder like the following, half to one level teaspoonful. He may take it every hourly alternating with either milk and barley or milk, egg and gruel or barley beaten together. Generally the proportion of milk and barley is one pint of milk to a quarter of a pint of barley water. This barley water or gruel tends to make the milk curds finer. To a pint of hot milk is added one to two raw eggs and beaten well in conditions of weak state and malnutrition in the patient. About four to eight ounces of this milk mixture is taken every hourly alternating with the antacid aperient powder, with a little water. At night too the patient should be made to get up and take the powder and the milk mixture, so that the night secretion is also neutralised.

Sodium bicarbonate	gr 60
Menthol	gr 6
Pulv Creta aromaticus	gr 120
Bismuth Carbonate	gr 120
Potassium Bromide	gr 120
Extract Belladonna Sicum	gr 8
Magnesium Carbonate Ponderosus	ad oz 3

One is not much in favour of adding sodium bicarbonate to this powder except in small quantities on account of its acid stimulating after effect and also due to increase in the blood of sodium ions which tend to augment the gastric juice

By this simple method and specially by the powder, mentioned above, containing bromides and belladonna which inhibit the formation of too much acid juice the result is generally good. The dose of magnesium carbonate may be decreased when there is diarrhoea and the proportion of bismuth increased. In an average case the above antacid powder tends to cause diarrhoea, the latter being useful for these constipating persons of ulcer, when troublesome it may be checked by more of bismuth added to the powder. *Alcol*, an aluminium silicate may also be added in two drams to the above powder, with good result.

Olive oil etc. Along with the powder one to two tablespoonfuls of olive oil may be given, when the above treatment is not enough to combat the hyper acidity completely. But as it is not pleasant to take, hence many workers advocate either cream or butter to be taken in suitable quantities specially at night, as during sleep when there is a likelihood of missing the milk gruel mixture and the antacid powder for some time. Olive Oil and these fats have got very pronounced acid neutralising properties and that for a longer time, than is possible by milk and its preparations.

Belladonna & Bromides If the pain and discomfort are not materially relieved in a week's time and in those cases where the risk of pyloric obstruction is probable, one gives in addition to the above, a mixture containing about ten grs. of potassium bromides and five to eight drops of tincture belladonna every four to six hours or frequently in addition to the above antacid powder. These are to be pushed just short of poisoning symptoms, by belladonna.

Night Secretion On bad cases, where there is more than a few ounces of gastric juice at night, it is evacuated out by the Señoran's evacuator and the stomach is washed twice, at night, at ten P.M. and between three to five A.M. respectively, which may prove effective. But to do this is rather difficult problem except in the hospital. In private cases most of these conditions improve under the regime discussed above, specially if the patient takes the antacid powder and the milk mixture at night and also the belladonna and bromide mixture just before going to bed. A few table spoonfuls of some suitable fat keep the acidity neutralised for some time and is of special use for the night, thus allowing the person some rest through sleep.

Atropine Those who do not improve under the above lines of treatment, may require at night before retiring say at ten P.M. an

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injection of 1/100 to 1/60 gr. of atropine sulphate subcutaneously. This is of special use in intractable cases showing increased secretion of the stomach at night. This often obviates the unpleasant task of washing out the stomach.

Istamins Vitamins A, B and C should be supplied in adequate amounts because the A factor seems essential for the upkeep of the functional activity of the epithelium of the various living membranes of the system, and C vitamin⁸ when too much deficient may cause ulcers by undue fragility⁹ of the capillaries on the stomach wall by improperly nourishing the capillary endothelium. B vitamin is also important on account of its effect on the maintenance of the tone of the involuntary muscles of the intestines. Lack of vitamins in diet during Sippy treatment may show pronounced signs and symptoms of avitaminosis. Even stones in the bladder are known to have formed.

Diet Milk is one of the best antacids and when mixed with some barley water or gruel, the curds become smaller. Eggs are more or less mild stimulants to the gastric secretion. Yet those patients who are under nourished and weak should have two raw eggs added to each one and a quarter pint of the milk mixture, and also should take olive oil, cream or butter in order to add a liberal caloric and food value to the diet. An additional advantage is the acid neutralising property of these fats when taken in suitable amounts, of one to two tablespoonsfuls every four to eight hourly during the day and in double the quantities, at half the intervals, at night, along with the other remedies or with some suitable modification.

Later on The interval between the milk mixture and the antacid powder should be an hour to start with, but in three to six days time, as the pain, discomfort and the local tenderness on pressure is gone, or much improved, the interval may be lengthened to one and a half hours, later to two hours or longer. After the third or fourth day or so, with the improvement of the signs and symptoms locally the patient may be allowed a piece of toast with butter one or two pieces of good biscuits, eggs, custard, a little oatmeal porridge with bananas, some fruit juice of good type etc. By the tenth to the fourteenth day, or earlier the patient may be allowed, 1 little soft boiled rice with milk and bananas, but as little sugar as possible. Boiled or suitably prepared fish or in the form of stew etc., may be added during the third week. Boiled potatoes smashed, with or without fish may be allowed too in the third week. During this time frequency of the milk mixture and the powder may be every three to four hourly. Gradually the patient is allowed boiled lean meat, vegetables of soft and succulent type. He should avoid all spicy and too rich, hot curries etc., and like

⁸ Graham, (1936) Lancet II p 364

⁹ Lancet, (1937) Editorial Oct 30 p 1029

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was one of failure. Gastric acidity was analysed in ten. It was increased in three, in two of which the radiological findings were normal. In ten cases the acidity had diminished to a great extent.

Sandweiss (1936 and 1937)^{20 21} investigated the comparative effects of histidine injection and diet, alkali treatment. Of his sixty seven consecutive cases twenty three elected to have injections of histidine, forty six to have diet alkali treatment. The immediate result though closely similar in the series, sudden disappearance of all discomfort in many patients, after a few injections was regarded as a striking feature. Follow ups showed that the recurrences were much lesser in the diet alkali series than in the other group. In seventeen cases gastric acidity determinations were made before and after the course of histidine injection but no appreciable change was observed. Of the twenty four patients examined either by skiagram or by operation after histidine treatment none showed disappearance of the ulcers. To determine whether the remissions after histidine injections were a direct result of this treatment Sandweiss (1937) treated twenty ulcer cases with daily injection of distilled water. He states at the time of publication the results of distilled water injection compared favourably with those obtained after injection of histidine monohydrochloride solution. Martin (1936) also arrived at the above opinion after comparative studies.

Hence the results of treatment by injection of histidine monohydrochloride are so conflicting that it would not be safe to use it as the sole means of treatment. It appears to relieve the symptoms more than to cure the actual ulcers.

Chlorine free diet and withdrawal of gastric juice

Mellinghoff and Kotsche²² (1933) showed that withdrawal of gastric juice was useful in gastroduodenal ulcer and gastritis. Addisin an extract of gastric juice was found on injection, to be a stimulant to gastric secretion; conversely withdrawal of gastric juice diminished gastric secretion. They were of opinion that basal metabolism rate had some influence in producing ulcers. They wanted to remove the chloride ions from the system by a salt free diet and periodic withdrawal of gastric juice. Injections of salrgan were given to produce diuresis and deplete salt from the system. This method of treatment appears to be of special use in cases of intractable hyper-

There are numerous patent remedies in the market for the treatment of gastro duodenal ulcers, but their composition and effects vary and it is not possible even to mention them. They all seem to act more or less on the principles of Sippy treatment. But it should be stressed clearly that to take any patent cure, however potent, casually will not cure a case of ulcer.

CHAPTER XLV

CONSTIPATION (HABITUAL)

(In Adults and Children)

Diagnosis etc

Before establishing the diagnosis of constipation one should try to ascertain the real state of affairs with the patient as many neurotics even healthy people have the idea though without reason that they are constipated. When none of the material of residue of the first meal taken after defecation is excreted within the next forty-eight hours the patient may by mutual agreement be called somewhat constipated. If no other suitable method of ascertaining if a person is constipated or not possible exhibition of a few charcoal biscuits swallowed before beginning the meal may serve this purpose. Each stool is inspected carefully to find out when the black one first appears. This gives one a rough and ready idea of the time taken for the contents to pass through the gastro intestinal tract.

Usually there are two types of constipated people. Both of these groups may suffer from the important clinical condition known as dyschezia or proctogenous constipation. Normally the urgency for defecation starts as soon as the faecal matter reaches the lower few inches of the rectum. If this delicate natural stimulus is disregarded and the patient does not visit the bath room gradually this area of gut loses its sensitiveness and results in the proctogenous type habitual constipation whose remedy lies in asking the patient to do his maximum of stool at regular hours whether there is any urgency or not. Thus by regularly habituating the patient, the only safeguard against such type of constipation is possible.

Spastic Constipation The subjects of this type of constipation are usually thin persons often neurotic complain of ill defined areas of tenderness scattered all over specially on the abdomen and as a rule minutely describe their signs and symptoms.

Physical examination usually reveals a distended caecum which may be tender, the sigmoid colon feels like a cord and there may be some degree of ptosis of the abdominal viscera. Spasms of the sphincters haemorrhoids and fissures are common in these subjects.

The atonic type These persons commonly have characteristics quite opposite to those mentioned under the spastic group. They are generally quiet steady not uncommonly obese, sthenic but anaemic persons who are rather elderly and have neglected now and then the urgency to defecate. They have

beal etc., may be of use. Dried figs raisins, dates all have slight laxative effect. Green and fresh vegetables not only help us to get rid of the constipation but are rich sources of mineral matters and are almost as useful articles of diet as milk itself. Green papaya, figs when taken cooked serve also as laxatives. Sugar candy water with 1/2 a ghula say half a glass or one cupful of the former and two teaspoonfulls of the latter may be of use in avoiding constipation. A pleasant drink may be taken during the noons of summer months of the above soured with a little lemon juice to suit the taste of the individual. This combined drink is of much use in habitual constipation since water etc. To drink a glass of water each at bed time and just after leaving the bed early in the morning may be of service to those cases where the water intake is insufficient or less than average. Those who drink plenty of water are seldom constipated. Mineral waters from various sources such as Vichy, Hartogate, Carlsbad, Kissingen etc. due to their slight saline content mostly of sulphates serve as laxative. Water is of special value in cases of spastic constipation. A cellulose rich diet with roughage may not be of much use in these spastic cases.

Massage and electricity Massage of the abdominal muscles combined with electricity like application of short Faradic currents after some active physical exercise may be of some help. But nothing appears to compare so favourably with the results of the active physical exercises such as body bending with active massage suggested above.

Vitamin B Vitamin B appears to keep up the tone of the involuntory muscles of the intestines and prolonged lack of such an important accessory food factor may by weakening these intestinal muscles cause constipation. Eggs are good sources of B vitamin and may be regularly taken. Liver is also a good source. Marmite, brewer's yeast extract are also good sources of this vitamin.

Medicinal Treatment Drugs specially of the laxative and purgative group are often indispensable specially at the beginning of treatment. But as most patients are unwilling to take it long, all effort should be made to educate the bowels in such a way that at the proper time an urgency for defecation is felt. The list of purgatives is so numerous that it is not always possible to mention their actions except in groups to which the individual belongs.

Saline purgatives As they act by withdrawal of water into the gut by osmosis and the evacuation is as a rule watery, they are indicated for the fat plethoric subjects or for persons having hepatic and portal congestion or in cardiac or renal disease with oedema. They are better avoided by debilitated old or nervous people. Women are also not very good subjects for treatment by saline purgatives. Salines are usually taken well diluted just before breakfast. Sulphates phosphates and tartrates are used for such purposes. Dose varies according to

individuals Magenesium sulphate is very active, because its both ions exert osmotic action The stool is as a rule watery

Anthracene Group This includes a group of purges quite suitable for habitual constipation They include aloes, senna, cascara, rhubarb, etc Phenolphthalein also is included by some in this group But their local action on the bowels is lost soon and not infrequently they need change one from the other Idiosyncrasy and suitability play an important part in these groups of purges and one which suits one person well, appears sometimes unsuitable for the other

Cascara Best given at night in one to two drams of liquid extract cascara sagrada with either tr hyoscyamus or belladonna, in thirty and six minimis respectively The action is usually got the following morning The dose should be gradually reduced as the bowels are educated to natural action

Senna Decoction over night of pods or leaves is useful Specially suited for women It is usually a non gripping purge The leaves may be bought from the grocers in an ordinary bazar and are sold in Bengal under the name 'Sonamukhi' leaves About one hundred clean leaves in nearly two ounces of hot water with a little sugar candy and a few anisi seeds kept over night give a deep straw coloured fluid which will have a laxative action It is pleasant to take in the form described

Aloes It forms the active constituent of many bed pills and is a very useful laxative, but it may be somewhat slow in action

Rhubarb Best given as pilula rhei co , or pulv rhei co , in five grains of the former and twenty grains of the latter, to be repeated as required This is of special use in children with excess of mucous secretion in the bowels

In order to prevent the gripping action of these drugs, either three to five drops of tincture of belladonna or fifteen to thirty drops of tincture of hyoscyamus may have to be added as correctives to the above purgatives These vegetable aperients are as a rule not much habit forming

The Mechanical aperients These are said to be lubricants to the intestinal tract Liquid paraffin, in one to two ounces was a favourite once, but did not stand the test of time There are numerous emulsions of liquid paraffin with agar sold under various trade names such as agarol, petrolagar, etc But their action is often due to the small amount of phenolphthalein they contain Generally suitable for children but is unsuitable for persons showing sometimes any bilious tendency, specially if the liquid paraffin is taken alone and in a large dose at a time there is not uncommonly spoiling of the clothes

by only the paraffin coming out without much effect on the constipation. In order to be effective these purges should be taken in small divided doses twice or thrice a day along with milk or food materials.

There are others like normocol which increase the bulk of the intestinal contents in this group are included 'ispaghula' or *Plantago ovata* seeds a household but very effective remedy agar and other substances which gain in bulk in the intestines after absorbing water.

Castor Oil It is seldom used as a regular purgative. It has its action on the small and large intestines, due to constipating after-effect it may be used with advantage in cases of food poisoning diarrhoea etc caused by irritants. In constipation of children and elderly people it is one of the best remedies. Mixed with glycerine the odour is covered to some extent.

Sulphur The confection or the lozenge is easy to take. The laxative action is mild the stool being soft, is of special use in painful conditions of the rectum and anal canal such as haemorrhoids or fissures etc, though the stools may be rather offensive.

*Isacen tablets*¹ One to two tablets of 1/13 gr each at bed time are generally enough. In very obstinate cases two or more such may have to be given. Main action is on colon.

Enemata These are generally indicated for cases where the stool is hard or in impacted fecal mass preventing the passage of a normal motion. They are also of use in constipation with debility infection, inanition etc. For very weak states glycerine enemata consisting of an ounce each of glycerine and warm water may be all that are required. Two ounces each of liquid paraffin and olive oil, are of use, as an enema for the removal of impacted feces.

Water enema McKenny² (1927) urged the use of a pint of cold water being used as an enema daily for a week to be followed by douching on alternate days for the next seven days and less frequently later, to re educate the bowels to natural evacuating action. According to him two pints of warm water enema lull the intestines to sleep. Soap he thinks to be too irritating. When there is much congestion of the lower gut, normal saline or enema of one per cent soda solution about a pint, for an adult may be of use.

Levy³ (1920) gave two teaspoonfuls of the following mixture per four ounces of water to be given as an enema with good results.

Rectified spirit of turpentine	5 c.c.
Cotton seed oil	25 c.c.
Glycerine	45 c.c.
Soft liquid soap	45 c.c.

1 Medical Annual (1926) p 53.

2 Jour Amer Med Assoc (1927) 89 p 1030.

3 Ibid (1920) 70 p 17.

oil and liquid paraffin enema left overnight in the lower bowels may be the last resort in protracted constipation with a greedy colon producing hard impacted stools.

PROCTOCOLONIC CONSTIPATION OR DYSCHEZIA. This condition is most common in women, whose abdominal muscles become weak from repeated child birth. Such persons in possession of greedy colons may not visit the bath room for days. Unless the intestinal contents are rendered fluid by strong purges they cannot evacuate the bowels. Besides educating them to form regular habits to go at regular hours daily, they should try to increase the tone of the abdominal muscles, and take plenty of water and vegetable so that the stools will be bulky and not too hard. In bad cases enemas and suppositories may be the last resort. But by far the re-education and bringing back of the sensitiveness of the rectum is the ideal that one should strive to be achieved by his patient.

CONSTIPATION IN CHILDREN

Infants. Usually two or more motions in twenty four hours is normal in infants but even if there is one stool a day provided it is sufficient, and the child grows properly there is no cause for worry. Simple under feeding⁵ as shown by failure to grow may result in constipation in infants, under such circumstances a little increase of the food or according to suitability, a little excess of sugar or fat in diet is all required for an average case. In cases of sluggish rectum a stalk of a betel leaf properly oiled may be introduced with success, other mechanical devices have been improvised.

Simple atomic constipation, may be found in atomic rickety infants with fat abdomen. They improve through proper care of their health, and diet. Addition of D vitamin and abdominal massage and so on, may help.

When the stool is white and chalk like probably the lithia secretion is poor or there is excess of milk caecum. Under such cases 1/2 gr doses of grec powder twice or three daily will do some good. In excess of caecum if milk is mixed with barley water, or cornflour, matters may improve.

After the age of infancy the treatment of constipation of children is almost in the same lines as that in the adult⁶

CHAPTER XLVI

DIARRHOEA

(Acute and Chronic)

Diarrhoea.

Besides others one essential of diarrhea is the abnormally rapid passage of the food residue through the alimentary canal, hence it is a direct counterpart of the common forms of constipation in which the food takes unusually long time to pass out.

Diagnosis. One must ascertain first, if the passage of the stools is taking place with abnormal rapidity. When the stools are fluid or semiliquid many people think, erroneously, that they are suffering from diarrhoea.

In all doubtful cases a few charcoal biscuits or lozenges are given with some food immediately after the bowels have moved in the morning. Each stool passed subsequently is examined and the one in which the charcoal is passed is noted. If it is passed within twelve hours' true diarrhoea is present. In severe cases it may pass out in a few hours if the time taken is less than four hours most likely, not only the colon but also the small intestines are involved. If no charcoal appears in forty-eight hours then constipation and not diarrhoea is to be suspected.

In very acute onset, the suggestion is that the cause is a toxic or infective agent. In toxic cases there may be purging, vomiting etc., but in infective states there is as a rule fever of varying degree, quick pulse, thirst, headache, malaise etc.

Whereas a gradual onset of chronic diarrhoea in a middle aged individual, with loss of flesh, specially if the patient was formerly constipated suggest neoplasm.

In all cases of bowel diseases a careful rectal, sigmoidoscopic, culture, microscopic examination of the stool are of use. In refractory or suspected cases a shiagram after barium meal or enemata may be useful.

Differentiation has got to be made from cholera, dysentery, tuberculous diarrhoea, syphilis and cancer rectum, etc.

Etiologically diarrhoea may be:—

(1) Gastrogenetic, (2) Pancreatic, (3) Enterogenous, (4) Due to colon involvement, (5) Nervous.

The tongue palpatory findings of the abdomen, and general somatic feeling of the patient should form guides as to the indications and results of treatment.

CHRONIC DIARRHOEA

Chronic diarrhoea which is only a symptom may result from numerous different causes, hence treatment will depend upon the cause. Routine treatment of any and every diarrhoea by astringents is not justified. Before one can

come to a diagnosis, a thorough examination of the stool macroscopic and microscopic exploration by sigmoid, sigmoidoscope and the fingers may be essential. Stomach contents may have to be seen after a test meal. Retention, colour odour, consistency etc., of the stool are points which are of importance diagnostically. Tuberculous growth and other physical troubles of the intestine causing diarrhoea should always be excluded.

In Colitis There may be only discomfort in the lower abdomen and diarrhoea, but it may result from (1) chronic catarrhal colitis (2) chronic ulcerative colitis (3) from growth in the colon.

Nervous or Enteric diarrhoea is due as a rule to excessive irritability of the intestinal nerves. It generally manifests itself as an urgency for evacuation of the bowels during or immediately after a meal. During emotion or fear also the bowels tend to act.

Enterogenous may be due to catarrh of the small intestines caused either by stagnation of circulation as in cirrhosis of the liver, pressure on the portal veins, ascites etc. In cases of chronic alcoholism catarrh irritation of undigested food causing diarrhoea there may be infections. Chill on the abdomen may sometimes cause diarrhoea. The stool may contain some unaltered bile specially in children when the small intestine also is involved. Tuberculous diarrhoea is not uncommon the doughy feel of the abdomen may be evening rise of temperature and failure to respond to average treatment may help to come to a diagnosis.

Hepato pancreatic In these cases there is white greasy stool with undigested fat not uncommonly very offensive. The patient is generally very emaciated from lack of absorption mainly of fats and partly of proteins.

Gastrogenic These cases are due either to chronic gastritis or achylia. Sometimes there is vomiting along with it.

Diarrhoea due to uremia etc. Not uncommonly cases of uremia may show diarrhoea. Here the tongue is usually heavily coated and the vomiting persists though the diarrhoea stops where as in cases of ordinary diarrhoea the vomiting stops first then the diarrhoea. But the examination of the cardio renal system and a careful urine analysis and blood biochemistry may solve the mystery.

Reaction of stool From the reaction of the stool diarrhoea may be divided into fermentative with acid stool as tested by litmus paper as opposed to putrefactive with alkaline reaction.

TREATMENT OF ACUTE DIARRHOEA In cases of fever and weakness the patient should be strictly confined to bed. In less severe cases too, rest, warmth on the abdomen, and avoidance of movement are of use in helping a quick recovery. If the patient is seen within the *first ten to four hours* of onset, and with reason to suspect that there are still irritant materials in the intestine it is better to begin with a dose of castor oil emulsion. The tongue and the palpatory findings and the subjective feeling of the patient are guides as to any castor oil is to be given or not. If the tongue is clean and the abdominal discomfort less, probably nature has done the job by removing the irritants automatically through diarrhoea. One is gradually coming to the conclusion that so long as there is diarrhoea, some irritation in the gut is likely, hence the advisability of beginning

treatment always by a dose of castor oil which clears both the intestines. Castor oil mixture is given in something like the one prescribed for amoebiasis, one dose once or twice daily.

In cases where there is only diarrhoea, but not much of the irritants left in the gut, a binding powder like the following may be of use:

Bismuth Carbonate	gr	10
Kaolin	gr	10
Soda Bicarb	gr	5
Pulv creta Aromat cum opio	gr	2
Sugar of milk	ad gr	40

one powder twice to four times a day after meals. Half to two grains of Dover's powder after each meal, till two such are given, may be of some use.

The above may be given suspended in mucilage tragacanth and pulv creta aromat cum opio, replaced by two to five drops of tincture of opium with good results. But any preparation of opium should be given cautiously to children and young people. In the majority of cases a little kaolin and bismuth are only required to stop the motions.

In summer diarrhoea or in infective diarrhoea, after a dose of castor oil mixture one may give five to ten drops of dilute sulphuric acid with equal dose of dilute hydrochloric acid, once or twice a day and it may do much good. The non official acid sulphuric aromaticus may be given in the above doses instead of the plain dilute sulphuric acid.

In conditions of pain in the abdomen, hot fomentations, turpentine stups may prove of use. A binder for the abdomen to prevent it from getting chilled is to be ordered in all cases of diarrhoea specially when severe.

In bad cases of pain and collapse not only glucose saline need be given but if the pain is very pronounced morphine is indicated. It is given generally in doses of $\frac{1}{6}$ gr of morphine and $\frac{1}{100}$ gr of atropine.

In cases of intense dehydration as is seen from the physical appearance of loss of fluid, deliriation and raised specific gravity of blood, transfusion of saline may be urgently indicated (see Cholera).

In vomiting of a protracted nature the remedies suggested under this symptom of black water fever and cholera may be used.

Food & Drink etc. During the acute stage, preferably plenty of plain water, barley water, green cocoanut water, fruit juice are given. The thirst may be intense and should be satisfied by free supply of liquids. Afterwards one may grant milk diluted half and half with lime water. If there is vomiting, this non irritating diluted milk be

given in half to two ounces. Milk diluted with soda water, or barley water may be of use. Gradually one adds chicken soup, baked custard, some cereal food like rice or potatoes and so on. Good butter milk, due to the salutary effects on the intestinal flora may do some good. When there is any suspicion of *protein putrefactive diarrhoea* as found out by the history, alkaline reaction and foul odour of the stool, bacillus acidophilus or lactic acid bacilli alone or in curd or 'dahi', may do some good. Hot food or drink may bring about a relapse, hence the importance of giving food and drink just pleasantly warm or properly cooled down. But as convalescence progresses the patient is allowed ordinary soft rice, curry of live fish, or suitable vegetables such as green banana, figs etc. Bengal fruit in its various stages may be taken either roasted or boiled as syrup, decoction of pulp, or ripe. It is of use in all forms of diarrhoea and dysentery.

CHRONIC DIARRHOEA —

Successful treatment of chronic diarrhoea, which, is secondary to organic disease of the intestines, like colitis tuberculous lesion of the small intestine or cancer colon, depend upon respective proper measures.

In other conditions where no reasonable organic cause could be found out, the patient should be confined to bed, because a large percentage of cases improve considerably when put strictly to bed and a binder preventing local chulling is applied on the abdomen. Unless the patient is in bed and gets completely well and that for sometime, it may be likely that the condition will recur as soon as he is up and about.

The cases of fermentative² diarrhoea with sour smelling frothy stools, frankly acid to litmus are mostly the results of excess of sugary food or carbohydrates³. In them all carbohydrate, cellulose, sweets, etc., should be completely excluded from the dietary.

A powder containing five to ten grains each of lactopeptine, pancreatin, trypsin, calcium carbonate and sodium bicarbonate after food may do some good.

Putrefactive Diarrhoea which is mainly due to protein putrefaction, the stool is alkaline to litmus, very offensive and may be small in bulk. These patients should not get any other diet except barley water during the sub acute stage and soft rice, glucose water etc. in the chronic stages. Butter milk, dahi, curd, lactic acid group of bacilli are of special value in protein dyspepsins.

Gastrogenous diarrhoea should be treated by dilute hydrochloric

² Schenster (1933) Arch f Verdauungsker 54 p 145

³ Amer Year book of general Medicine, (1934) p 763

acid in twenty drops to a dram with double the amount of glycerinum pepsini taken after the principal meals twice daily

The diet should contain small amounts of meat, and it must be carefully and fully masticated before swallowing

Colitis Catarrhal colitis of an acute type should be treated in the same lines as all other cases of diarrhoea in general

Mucous or Mucomembranous colitis a thorough examination should be made to exclude any organic disease before the diagnosis of chronic colitis is made, as it is difficult to treat. There may be visceroposis, and constipation as a rule present and the subjects are more commonly women

Treatment should begin with the patient in bed. If there is pain, fomentation should be given to the abdomen. The nervous temperament should be dealt with, by bromides in ten to twenty grains. Tincture belladonna in five to seven drops with hq extract cascara sagrada in half to one dram doses twice daily may do some good

Faeces of hot olive oil upto four ounces may be given with some relief

There are two groups of dietary advocated

(1) A bland non irritating one, consisting of lightly boiled eggs, pounded meat or fish boiled and smashed potatoes, toast, boiled rice, Khichuri, butter cream, milk etc. No vegetables or fruits which leave an unduly big residue are allowed. This is advocated by many and is useful

(2) Coarse diet—which consists of whole meal bread, raw or cooked vegetables, fruits etc., mainly advocated by German workers

After a few weeks treatment in the above lines the patient may be allowed to leave her bed, but she should rest in bed for sometime after each big meal

These persons usually women are highly neurotic and sometimes treatment by psycho analysis may have to be done. But no pains should be spared to induce them to lead a normal life with rest and physical exercise suitably combined together. They should be discouraged from making a scrutinising survey of their stools and asked to refrain from brooding over their physical ailment and abdominal discomfort

matic, if to allow the stomach to remain empty with the acid secretion for a long time, tending to keep an ulcer active is a sound rule. He gives puree diet which includes—at six A.M. tea with white bread and butter, nine A.M. oatmeal with milk, white bread and butter one, P.M. dinner, three P.M. coca, six P.M. white bread and butter meat dishes cheese and tea, variety is given by meat balls, omelet, fish balls, rice, tapioca, puddings, soups etc.

Fluids Small sips of fluid may be allowed even under the conservative regime after the first twelve to twenty four hours. In cases of big hemorrhage subcutaneous saline injection in one to two pints with ten to twelve point five per cent glucose may be useful. But the blood volume should be made to increase with caution as it is by the loss and consequent lowered blood pressure that the coagulation starts and to disturb it by increase of the volume of blood may not be very safe unless done cautiously and gradually.

All hemostatics are more or less of doubtful value, but they need be tried specially to do something for the patient.

Hemostatics Some believe in giving two c.c.m. of adrenalin chloride solution (1:1000) in a few ounces of water to be taken in sips with the idea that it will act as a local hemostatic and may be worth trying in all intractable cases of gastroduodenal origin.

Coagulants such as whole human blood ten to twenty c.c.m. intramuscularly into the buttocks, every eight to twelve hours is worth a trial but the donor should reasonably be free from syphilis malaria and such other communicable disease. Sodium citrate solution five to ten per cent five to ten c.c.m. intramuscularly or intravenously may act as a good coagulant by breaking down the platelets. *Haemoplastic* substances like *coagulin* (*ciba*) *haemoplastin* or *neohæmoplastin* in two to ten c.c.m. may have to be given with good result. One per cent solution of *Congo red* upto ten c.c.m. intravenously may be used with advantage. All these remedies may have to be repeated every four to eight hours. Recently Woldman (1937) has treated twenty-one cases of severe gastroduodenal hemorrhage by the continuous administration of *colloidal aluminum hydroxide* by means of a special drip apparatus with success.

Transfusion of compatible blood even upto five hundred c.c.m. may tide the exsanguined patient over and help to control the original disease.

Diet Vitamins specially A, B and C are of use. Fruit juice, eggs, butter supply them all to some extent. According to the conservative methods soft boiled eggs, milk and porridge etc., may be allowed after twenty four to forty eight hours according to the severity of the

Commoner Diseases of Liver and Gall-bladder

CHAPTER XLVIII

JAUNDICE

Diagnosis etc

Jaundice or icterus is a symptom characterised by the presence of bile pigment in blood manifested by yellow colouration of the skin mucous surfaces, pruritus slow pulse nausea or vomiting delayed coagulation of blood and others.

As the treatment to be scientific should be according to the cause it is imperative that a proper diagnosis as to the pathogenesis of a particular case of jaundice is first made out before treatment is undertaken.

The diagnosis may be facilitated by the history, age sex of the patient. Presence or not of fever, torpor, pain etc may be useful. The duration, degree of jaundice condition of gall bladder liver and spleen nutritional state of the individual may afford important aids in diagnosis.

The character of the duodenal contents van den Bergh's test¹, fragility of the red blood corpuscles and others also may afford some clue as to the underlying cause of jaundice.

TREATMENT

This should be done according to the corresponding pathogenesis. Rest in bed, warmth and poultices or cataplasma kaolini etc, over the liver and gall bladder region may be of relief. No fats and very little of protein mainly carbohydrates and sugar should be allowed in the diet specially during the acute stages. For the constipation which may be associated with lack of bile should be combated by saline purges or by purgatives of the anthracene group. Divided doses of hydrarg subchloride, in a prescription like the following may be of use:

Hvilarg Subchloride	gr 1/2
Sodii Bicarbonatis	ad gr 2

one every half an hour at bed time till four are taken, followed in the morning by saturated solution of magnesium sulphate half to one ounce. Frequent uses of saline purgatives and alkalies are beneficial.

Toxins etc. These should be treated in their usual lines according to the cause, or as in cholera and blackwater fever.

*Non surgical drainage*². Introduction of a solution of magnesium sulphate through a duodenal tube into the duodenum causes a great flow

1 Mc Gee (1923) Quart Jour Med 16 p 790

2 Twiss, (1931) Jour Amer Med Assoc Mitch 18 p 792

of bile. This measure has been utilised for the purpose of draining the gall bladder in cases where there are indications.

Meltzer³ (1917) was one of the first to describe it. Generally, seventy five c.c.m. of a thirty three per cent solution of magnesium sulphate are introduced by a duodenal tube⁴ (Ryle's modification of L'inhorn's tube). The action is described "It may relax the sphincter of the common bile duct and permit the ejection of bile and permit even the removal of a calculus of moderate size etc." Different types of bile appear, first from the common bile duct, then from the gall bladder and so on. Lastly comes bile from the liver.

This drainage may be continuous or intermittent. It is useful in the treatment of most of the following conditions: (1) Relapsing cholangitis (2) Obstructive jaundice (3) Quiescent cholelithiasis (4) In other bile tract disease where surgery is contra indicated (5) For closure of biliary fistula (6) Catarrhal jaundice clears up usually from two to seven days (7) Early gall bladder and bile duct inflammation (8) Continuous drainage is good for gall tract disease with duodenitis or average case of duodenal ulcer (9) In hepatic and intestinal toxæmia (10) Sick headache (11) Some forms of neuritis, arthritis etc suspected to be due to sepsis of the gall bladder (12) Useful for carriers of *Salmonella typhi* group of organisms and *giardia intestinalis* (13) Other conditions which improve are chronic pancreatitis, intestinal and biliary stasis, haemolytic jaundice etc.

Damage of the Liver. All cases of jaundice cause some degree of damage to the liver cells, but this is pronounced in toxic jaundice and acute yellow atrophy liver. In all cases where an injury to the liver is suspected three remedies are of use, they are glucose, alkalies and calcium.

According to Allhausen⁵ (1933) glucose is protective to the liver, (1) by its assistance to oxidise toxic compounds, (2) functional deficiency of the liver is favourably influenced, (3) injured liver tissues are easily repaired, (4) increasing the coagulability of blood which is lessened in all forms of jaundice.

For hepatic dysfunction or jaundice, half to one pound of glucose is best exhibited per day orally. Recently glucose and insulin are advocated for jaundice, notably when in association with toxæmia, subcutaneous injections of about twenty units of insulin⁶ for fifty grams of glucose given orally or a twenty five to fifty per cent solution intravenously may be of much use. German workers are in favour of

³ Jour Amer Med Sci (1917) April 51 p 469

⁴ L'inhorn (1920) Duodenal tube and its possibilities Samuels Phila

⁵ Jour Amer Med Assoc (1933) 15th April p 1163

⁶ Barker, (1931) Treatment of commoner diseases p 162 Liverpool

decholin tablets in four to five grs thrice daily, intravenous injection of one ampoule of decholin daily or on alternate days may be useful

Urotropine solution (forty per cent) five to ten c cm intravenously with or without glucose, along with oral administration of alkalies may be of definite service. This should be given daily or every twelve hours till six to twelve such are injected. Useful in catarrhal and simple forms of jaundice and biliary cirrhosis etc

Cytotrophin a combination of urotropine and cassinine has been extolled by some. One ampoule given by injection daily or on alternate days may suffice but appears to have little advantageous effect over urotropine

Alkalies calcium etc per mouth, should be given. Sodium salicylate appears also effective in some of these cases. Orally one may give a prescription like the following

Sodn Salicylate	gr	5
Sodn Bicarbonate	gr	30
Sodn Phosphate	gr	60
Ammonium Chloride	gr	8
Sodium Glycocholate	gr	5
Glucose powder	gr	60
Aqua Chloroformi	ad fl oz	one
		one dose three daily

Saline jurgatives should be given freely. Bowels washes given daily may be of use specially when the intestinal flora of bacteria are likely to be a probable cause. Calcium gluconate with parathyroid and vitamin D may be advantageously given orally. Ostocalcium tablets, or calciferol may be of use

There are doctors who advocate with some reason too the administration of *dilute hydrochloric acid in small doses* in sips with water twice a day

Itching Divided doses of hydrarg subchloride in a prescription like the following may do good

Hydrarg Subchloride	gr	1'
Sodn Bicarbonatis	ad gr	2

one powder three or four times a day at half hourly interval after the last meal at night

Carbolic acid solution one in hundred in distilled water may be used to wipe the areas where it is itching. One to two per cent solution of sodium bicarbonate in distilled water may be used to wash the itchy parts. A hot bath in alkaline water followed by rub of rectified or methylated spirit and proper dusting with powder may cause some relief

Recently histamine is being used with advantage for pruritus. It is given by subcutaneous injection in very minute doses.

Pilocarpine in 1/4 to 1/8th grain, orally may relieve this trouble some itching. Some suggest 1/4 to 1/2 gr. of extract thyroid siccum three times a day for the pruritus.

For haematemesis and melena the corresponding chapter should be consulted.

Hæmorrhage For the hemorrhagic tendency calenium in the form of gluconate and levulinate, five to ten percent solution in five to ten c.c.m. may be injected with good results. It may be repeated every eight to twelve hours according to requirement. Liver extract may do some doubtful good.

Fruits etc Butter milk, fruit juice, sugar or sugar candy water with lemon juice, dhr. water, sugar cane juice, barley water, soda water, etc are helpful by promoting diuresis and protect the liver from damage.

Cholæmia Not uncommonly in bad cases the patient may show cerebral symptoms due to cholæmia which may manifest itself in undue sleepiness or excitement. It is rather a serious condition and may terminate the scene of cases of torpid jaundice, cirrhosis of the liver and so on.

Treatment consists in giving injections of ten to twenty units of insulin every eight to twelve hours, with double the amount of glucose in grains as the units of insulin. Transfusion of normal saline with glucose may also be useful. Bromides are best for quietening the patient. Preparations of opium may prove dangerous due to the loss of the detoxicating power of liver.

CHAPTER XLIX

CIRRHOSIS OF THE LIVER

Diagnosis etc

Though there are several forms of cirrhosis of the liver the commonest is the portal or multilobular cirrhosis in which the liver surface is irregularly nodular hence called bob nail liver the organ being impalpably shrunken.

Generally the patient is above the age of thirty years shows enlarged spleen prominent veins on the abdomen hemorrhoids hematuria or melena are not infrequent. Ascites poor nutrition the typical hepatic facies etc make the clinical picture highly suggestive. In the early pre-cirrhotic stage there are symptoms of gastric catarrh and those of congestion of the liver, the edge of the organ is sharp and hard like the edge of a knife. Water brush, indigestion, loss of appetite, constipation may dominate the scene.

Later on, comes the typical cirrhotic stage with most of the symptoms and signs mentioned above.

Though there is no unanimity of opinion as to the pathogenesis of this condition probably there are always two factors one causing congestion of the organ and an irritant which causes damage to the liver cells in an already congested organ. Some think it to be due to repeated anaphylactic shocks, and the damaged liver cells replaced by fibrous tissue.

HYPERTROPHIC BILIARY CIRRHOSIS

The condition is generally seen in young persons between 10 to 30 years. There is palpable enlargement of the liver which is as a rule smooth. The spleen is also enlarged. Jaundice is as a rule pronounced. Fever may be present and other young members of the family may be affected too. The disease appears to be infective in origin. Absence of parasites in the blood and other cogent findings distinguish it from similar morbid states in which jaundice is associated with enlargement of both liver and spleen. Some workers think it to be an infection and not cirrosis of liver.

TREATMENT

In the early stages

Removal of the probable causes is the most important treatment

The patient should have as much of rest in bed as possible, three to six weeks are preferable. He may sit up for a few hours if he likes. Alcohol, hot spices, mustard, pepper, curries etc., should be avoided altogether. He should live mainly on milk, three to four pints for the first three four days, with fruit juice and glucose drink in between. Plenty of alkaline or plain water is good for him. A prescription like the following due to its calcium, alkali and other biliary antiseptic and mild aperient actions may be of use.

Sodium Glycocholate	gr 6
Calcium gluconate	gr 10
Sodium Bicarbonate	gr 30
Sodium Salicylate	gr 5
Urotropine	gr 10
Soda Phosphate	gr 120
Glucose powder	gr 120
Aqua menthepip	ad fl or 1
one dose thrice daily	

Orally half to one pound of glucose in various forms may be quite useful by protecting the liver. Alkalies and Calcium should be given either as in the above prescription or in separate powder form twice or thrice a day. Insulin and glucose may prove of use too.

Purgative Specially salines are useful and should be given daily or on alternate days and may be preceded by divided doses of hydrog subchloride.

One of the best *intestinal antiseptics* is dilute hydrochloric acid in half to one dram doses after the main meals twice or thrice a day. As

There is gastritis and achlorhydria in many cases, so it is useful. Gradually a lacto-vegetarian diet should be adopted. Butter milk, lactic acid bacilli, *bacillus acidophilus*, milk curdled by the above organisms may be of use, by rendering the intestinal toxæmia lesser, because these lactic acid group of bacilli tend to alter the bacterial flora of the intestines to the advantage of the patient. Milk may be granted in small portions, once a day after the acute symptoms are over and this also according to the liking, previous habit, digestive power etc., of the patient. Meat in small portions may also be given when, such addition, is reasonably safe and does not entail any difficulty. When digestion improves and fat is properly assimilated small portions of fresh butter, cream etc., may be added to the dietary. Egg, butter milk, Indian sweets like *sondesh* or *rosogolla*, milk custard may be allowed in reasonable portions. Carbohydrates, fruits, sweetments unless fried and thus made undigestible, may be allowed.

Physical Exercise Beginning from mild forms one goes on gradually to more vigorous physical exercise. At the beginning massage, deep breathing, tepid bath and massage etc., are suitable later on as strength permits, one may take gradually increasing distances of walk, and if this is well tolerated, rowing, golfing etc. are to be allowed. Some form of reasonable physical exercise is good for these persons.

In syphilitic cases potassium iodide and other antisyphilitic remedies are of service and should be given according to indication.

ASCITIS

As soon as fluid tends to collect in the abdomen, besides trying to rectify further damage to the liver, as indicated above one should give saline purgatives and diuretics freely provided the kidneys are not damaged, as found out by repeated examination of the urine, and by the findings in the biochemistry of blood.

Diuretin, in four to six grains thrice daily with caffeine sodium benzoate in similar or smaller doses, may be tried, first along with simultaneous use of saline purges, the latter also helping elimination of water. If this does not afford the desired result, one should give ammonium chloride in twenty to thirty grains thrice or four times a day and when the urine is highly acid, as tested by blue litmus paper gives salyrgan.

Salyrgan is injected intramuscularly in $\frac{1}{3}$ to $\frac{1}{2}$ c cm test doses, a good diuresis means the drug is acting. If no diuresis follows¹, one may stop the injection altogether. The effect of the test dose passes off in one to two days time. Again one c cm may be injected, keeping the urine acid all the while, in three to four days' time as the effect of the second injection passes off another one c cm may be given, then

¹ Brunn, (1921) *Munch Woelnschr* 2 p 1224

again another one c cm and so on. Salvergan is a very bad irritant and the intramuscular injections may be extremely painful specially when even half a d op leaks in to the subcutaneous tissues. The pain may be reduced in intramuscular injection by drawing a few c cm of novocain along with it, and also care should be taken to force the contents only after the needle is well into the muscles. In intravenous injection too very particular care should be taken to avoid the infiltration of even fraction of a drop into the subcutaneous tissues, which means terrible pain etc. Not more than 2 c cm should ever be given at a time one c cm is better and safer and is the usual effective dose. As salvergan is a preparation of mercury, while the patient is under treatment and after his teeth should be carefully looked after and potassium chlorate and alum gargles given regularly at frequent intervals several times a day. Stomatitis, salivation,ropy saliva, painful and spongy gums, swelling of the sublingual and submaxillary glands are symptoms taken singly or collectively mean mercurialism. The required treatment of poisoning by mercurials as indicated in the chapter on mercury treatment of syphilis should be promptly instituted. Under no circumstances this powerful mercurial diuretic should be given to persons having arteriosclerotic or incompetent kidneys. In cirrhosis of the liver the natural detoxicating power of liver being considerably reduced these mercurials should always be given cautiously, in watch being kept over early poisoning symptoms. Needless to say that further injections should be discontinued at the first appearance of any of the above signs or symptoms of poisoning. The whole course is generally in six to twelve injections a suitable interval as indicated above.

Nitro-ant. Recently there is a preparation like salvergan which is called nitro-ant. It can be introduced as a suppository with good diuretic effect by injection.

Cure's Pill. Which consists one grain each of pilula hydripius, pulv. digitalis and scilla is a good diuretic and may be given twice or thrice a day. But here too due to its mercury content good care should be taken of the teeth of the patient.

Paracentesis abdominis. In cirrhosis of the liver and nephritis and as a matter of fact in all conditions of collection of fluid in the abdomen unless there are clear indications tapping should never be undertaken light heartedly, because in hydronephritis there is pronounced hypo proteinemia so also to a lesser degree in cases of "cirrhosis" of liver and in such a case to draw out a few pints of protein rich body fluid is a question which should not be taken very lightly. A genuine case of cirrhosis of liver will seldom stand more than a few tappings.

Besides others the following are the indications of paracentesis abdominalis

(1) Cardiac or respiratory embarrassment not relieved by ordinary means (2) When rales appear at the base of the lungs due to their compression (3) when urinary output is materially diminished and there is persistent oedema of the dependent parts (4) Persistent haematemesis may be relieved by paracentesis as this is likely to reduce the venous engorgement

Care should be taken to see that the patient's bladder is empty otherwise there is the risk of puncturing it. The intra-abdominal pressure is increased by tightening a bed sheet round the patient's abdomen, otherwise with the sudden relief of pressure by draining of the ascitic fluid he may bleed into his own planchitic vessels and faint or even collapse. A dose of stimulant mixture given initially may also be of use for this purpose.

It is quite expedient to give the patient ammonium chloride in twenty to thirty grains three daily and render the urine highly acid before tipping the abdomen. As soon as the fluid is drawn out the injection of the test dose of Salvigan is given provided the kidneys are healthy. Salvigan is repeated according to indication and thus prevents a rapid reaccumulation of fluid in the abdomen. It is futile to expect diuretics to act where all the while the heavy pressure of the fluid is pressing on the renal veins causing congestion of the kidneys hence the importance of giving diuretics when the pressure is relieved partially or completely by paracentesis.

Surgical Measures By Talmi Morrison's operation and its modification, one tries to fix the omentum on an artificially made raw area on the under surface of the anterior abdominal wall. The idea is to establish a vascular connection between the vessels of the peritoneum with those of the anterior inner surface of the abdominal wall so that the obstructed portal blood might drain through the abdominal blood vessels to the heart. The earlier the operation is done the better. Grav cardio-renal disease or jaundice contra indicates this operation being undertaken.

Sometimes despite of good drainage of the portal blood, there may be symptoms of systemic intoxication, because the portal blood normally gets detoxicated in its passage through the liver before reaching the heart. Here the blood goes direct hence the detoxicating action of liver no longer being in action symptoms of poisoning may be evident.

For the treatment of other signs and symptoms like haematemesis, diaper itching etc the corresponding writers may be consulted.

HYPERTROPHIC BILIARY CIRRHOSIS

Treatment This is done in the lines of jaundice. The bowels should be kept regularly open by salines and a salicylate, urotropine, glycocholate mixture as given in jaundice should be prescribed.

Dilute hydrochloric acid after food may do some good. Non-surgical drainage of the gall-bladder may be of definite use.

Diet etc., should be given as in cases of jaundice.

As some persons believe the spleen to be the incriminating organ hence, they advocate tying of the splenic artery.

Most important, items are the eradication of the probable causes of this disorder.

corresponding conditions in black water fever, cholera, etc. In acute cases vomits may prevent oral medication and administration of food. In such patients glucose and fluids should be given subcutaneously or rectally by drip method or per os.⁴

Dilute hydrochloric acid after meals may prove of value.

Diet should be as in patients of jaundice. Lactic acid group of bacilli may be useful. Amongst fruits, "beet", "papaya" are of good use. The patient, specially in chronic cases should avoid all fatty, rich meals. Proteins should be taken in strict moderation.

Sodium glycocholate and taurocholate, are sometimes useful and act by helping the drainage of the gall bladder. Non surgical drainage of the gall bladder may be of value. This should be done regularly and for some time till the patient is much relieved or cured. *Decholin*, injections or orally may do good.

A very important consideration is the removal of the source of the sepsis, which most commonly resides in septic teeth, tonsils, appendix, intestines, and so on.

The patient should lead a regulated life on a simple but square diet containing all vitamins, having less of fat and reasonable amounts of protein, to be proportioned according to the digestive and assimilatory power of the individual. Some form of moderate physical exercise appears of use, notably to prevent recurrences. The septic foci should be made known to the patient so that he can take care of them. Drinking of plenty of water and fruit juice may be useful. Constipation is bad and should be avoided preferably by saline purges, preceded wherever possible by hydrarg subchloride in divided doses.

CHAPTER LI

GALL STONES

(Cholelithiasis)

Diagnosis etc

Gall stones are more common in females than in males. It is rare before the age of fifteen. The greatest number of cases occur between the ages of thirty to sixty. Infection, hypercholesterolemia and tuberculous status conduced to some fraction. In fat, fair, females at forty, with frequent pregnancies,

raise intra hepatic biliary pressure. Glycerol trinitrate in 1/100 gr orally may do good.

In milder cases or in severe ones if pain still persists after morphine injection but not so acutely as before, one may give the following prescription which contains, analgesics as well as a purgative, with good results —

Vermom	gr	3
I uminal	gr	1/2
Hypoderm Subchloride	gr	1
Ext Belladonna Siccum	gr	1/4
Soda Birch	ad gr	8

One powder every three hours.

The dose of the hypnotic and analgesic may be made to vary according to indications. Saline purgatives should follow these as free movement of the bowels is generally useful. Inhalation of amyl nitrite temporarily and glyceryl trinitrate in 1/100 gr doses may do good in some cases.

Calcium chloride Bauer and others⁶ (1931) have suggested the slow intravenous injection of five to ten per cent solution of twenty c cm of calcium chloride for the relief of biliary and renal colic.

Warmth Hot water bottle or hot fomentation over the right hypochondrium may be soothing. In cases of persistent vomiting one pint of warm alkaline water may be used, preferably through a stomach or duodenal tube for gastric lavage. Hot bath specially with careful application of heat locally may be of comfort.

Non surgical drainage of the gall bladder is likely to be effective, but should not be undertaken till the acute symptoms have subsided. In cases of protracted vomiting gastric sedatives should be given as suggested in the chapter on cholera and blackwater fever.

When intractable As the tenth thoracic nerve on the right side supplies the gall bladder and the larger biliary ducts, so Barker⁷ (1934) suggests in his book a paravertebral injection of five c cm of one per cent solution of novocain to anaesthetise that nerve in cases of biliary colic. The point of the needle is to be inserted to the right of the spinous process of the ninth thoracic vertebra and is to be directed towards the intervertebral foramen.

As infection and stasis in the gall bladder are helpful to stone formation, all care should be taken to prevent these. For this purpose again proper drainage of the gall bladder by glycocholates

⁶ Butsel, Mc Cowan and Walters (1930) Ann of Surg 101 p 101,

⁶ Bauer and others (1931) Jour Amer Med Assoc 96 p 1-16

⁷ Barker, (1934) Treatment of common diseases p 167-168

and taurocholates, salicylates of sodium in suitable doses may be of special value. Plenty of urotropine and allies orally may do good, the former may be given intravenously, when sepsis of the gall bladder is persisting. Hydarg subchloride in divided doses at night in something like the following prescription may be useful.

Ext Belladonna siccum	gr	16
Hydarg Subchloride	gr	14
Decholin	gr	2
Sodn Bicarbonate	ad gr.	8

One powder at bed time, at half an hourly interval till four such are taken, followed in the next morning by half to one ounce of saturated solution of magnesium sulphate. Some advocate olive oil in four to ten drams thrice or more frequently daily. Glycerine in half to two drams, thrice daily may also be tried with some good.

Diet This should not contain fat or undigestible or fried articles. Small meals at frequent intervals, not only do not throw an extra burden on the digestive system but frequent meals help the emptying of gall bladder better, than infrequent big ones. Boiled or less richly cooked articles are good. As regards other articles of dietary, one should see the chapter on jaundice etc. Fat is preferably taken in the form of olive oil. Fatty and rich meals tend to favour colic. Proteins in excess are unsuitable too for such subjects.

In cases of poor appetite a prescription like the following may be helpful:

Tr Nux Vomica	m	7
Sodn Bicarbonate	gr	15
Infusur Chireta	ad fl oz	1/2

One dose half an hour to an hour before the principal meals, followed by quarter to half a dram each of dilute hydrochloric acid and glycerinum pepsin in a cupful of water, n sips, after the principal meals, may help by assisting digestion.

Pre-enteric measures The principles involved in this are, (1) reduction of cholesterol content of blood, (2) promotion of the flow of bile and increasing its fluidity and render it anti septic, (3) to try to disinfect the gall bladder.

Diet All cholesterol rich food such as milk, yolk of egg, cream, liver, sweet bread, kidneys, brain, need be forbidden. Iats to be given in strict moderation. Fried things are badly tolerated. Frequent, simple meals, of boiled meat, fish, vegetables, and carbohydrates are safer. Glucose alkalies and calcium rich diet are to be aimed at, notably to counteract any damaging effect of jaundice on the liver.

Drugs Potassium iodide in two to five grains or extract thyroid siccum in one to two grs thrice daily, decrease the cholesterol content of blood Calomel bile salts and some of the patent chologagia purgatives like mycol or felandine or tablets of bile salt, in the form of decholin thrice daily may promote drainage of the gall bladder Hexamine and salicylates with alkalies are useful for this purpose Injections of atropine or decholin intravenously with or without glucose may be useful

Iurgatives Saline purgatives and other combinations like the following may be of use It is used for its cheapness by some hospitals

Sodium Sulphate	gr	30
Phosphate	gr	30
„ Siliclate	gr	10
„ Bicarbonate	gr	20
„ Benzoate	gr	10
Spirit Chloroform	m	10
Glucose pulv	gr	60
Aqua menthipip	ad fl oz	1

one dose twice or thrice a day is curative as well as preventive

Clothing Specially for ladies all tight lacing etc should be forbidden Bending and stooping down may cause pain The abdomen should be kept covered by a flannel or suitable binder as local chilling may do harm

Mineral waters etc Vichy Apenta Hot spring water and other mineral waters may be of use due to their diuretic action The patient should be encouraged to drink plenty of water In suitable cases alkaline drinks with glucose may be of use

Physical Exercise Some form of physical exercise even if not too vigorous helps by preventing the stasis of bile Moderate physical exercise is definitely beneficial

Operative treatment If a gall stone enters the common bile duct or if signs of severe infection of the biliary passages with threatened perforation or empyema of gall bladder appear (fever high grade leukocytosis local signs etc) surgical intervention becomes imperative When operation is not imperative but is a matter of choice one will be governed by the degree to which the malady interferes with the patient's life

* The mere presence of gall stones demonstrated by cholecystography is not in itself sufficient indication for operation "

* The death rate after gall bladder operation is higher than that after appendectomy Moreover many patients who have gall stones or

the gall bladder or both removed may continue afterwards to have many symptoms that are very troublesome (due to the development of stenosis of the biliary passages, to pylorospasm, to formation of stones in dilated common duct or in the hepatic duct or to secondary pancreatitis)"?

Cancer of the Gall bladder is diagnosed by gradually intensifying deep jaundice as days pass on. Cachexia in the elderly, with mass in the right hypochondrium may mean cancer of the gall-bladder and may be indistinguishable from cancer of the head of the pancreas.

The treatment is mainly as indicated above, but this is only a palliation. Early surgical interference may do some permanent good.

Commoner Diseases of metabolism

CHAPTER LII

BRIEF CONSIDERATIONS ON DIET & METABOLISM

(Including Vitamins and their Deficiencies)

With the extraordinary progress in the science of dietetics from physiological, biochemical, nutritional and other aspects, big strides are being made in the advanced countries by the practical application of this knowledge for the improvement of their national health¹. But in our poor country even the rudiments of the well established basic knowledge are not being even partially utilised for the benefit of the people with the result that these improperly nourished, resistanceless persons are falling victims to all sorts of diseases to which a more scientifically fed nation is not likely to be susceptible to².

The usual dietary of most of our countrymen is far from adequate. The striking defects appear, in the lack of easily available protein mostly of animal origin, so also in mineral and vitamino elements.

The following points are worth emphasising

Proteins

A sufficiency of proteins whence are derived about twenty four individual upto now known amino acids, which the human body is

1 Sherman (1930) Chemistry of food and nutrition 3rd Edn MacMillan

2 McCollum and Simmonds, (1930) Newer knowledge of nutrition 11th Edition Mac Millan

just a state of sub-nutrition to become manifest into frank disease later on

VITAMINS

Vitamins At least six vitamins so far known appear essential for the upkeep of health. They are of considerable value hence the effects of their deficiency are given below in some detail.

VITAMIN A

Frank astamnosis of A

Lack of vitamin A in the diet over a prolonged period leads to changes of and injury to the epithelial tissues⁴ of the body. Thus the epithelium of the cornea undergoes keratinisation *xerophthalmia* develops and may lead to blindness unless promptly treated. We are learning too that the stones in kidneys are easily formed in persons whose diet lacks in the A factor. Recently radiograms demonstrated in some cases that by adequate exhibition of the A factor kidney stones got smaller in size.

The epithelial cells of the intestines and digestive glands are injured due to continued lack of A vitamin, hence digestion and absorption are interfered with. Similarly injury to the reproductive epithelial cells may lead to sterility in both sexes. It is probably because it keeps the epithelial structures intact that this vitamin has been called anti-infective^{5,6}. There is enough evidence to show that lack of A vitamin causes a diminution in the total number of blood platelets with a tendency to easy haemorrhage and even purpura.

Incipient astamnosis of A

Recently Richards⁷ of Aberdeen (1935) has shown by her extensive series of experiments the proper role of A vitamin in some of the hitherto unsolved problems of nutrition. Her results mainly show

- 1) The early occurrence of pathological conditions in young rats deprived of vitamin A (2) Very high incidence of gastro intestinal affections both in the young and old animals (3) The persistence of pathological conditions once established in animals inspite of subsequent dosing with vitamin A (4) Parallelism between the findings in rat experiments and various reported cases of disease in human beings⁸

The Medical Research Council by their experiments have shown⁹ that in the case of vitamins in general 'the damage caused by insuffi-

4 Walbach and Howe (1932) Jour Expt Med 37 p 511-536

5 Brown and Tisdall (1933) Brit Med Jour 1 p 53-5

6 Turner and Loew (1933) Jour Inf Dis 52 p 102-120

7 Brit Med Jour 1 p 99

8 Med Annual, (1936) p 506.

Edmon 36) p 507

ciency of vitamin A in early youth cannot afterwards be made good of, by an adequate supply of them and that much chronic ill health in later life may have its origin in this early deficiency."

The far reaching effects of the above few lines need some explanation. There are such terms recently coming into our vocabulary of nutrition as "sub-health" and "sub-nutrition". These are important as they are expressions of the vague ill healths and want of optimum nutrition which lead to loss of proper resistance, energy and strength with consequent lack of efficiency. There are certain border line states of physical health, which cannot be labelled as well-defined diseased conditions, inspite of lack in optimum health. Such cases are often due, beside, some subacute or chronic infections, to want of suitable dietary and not uncommonly to a lack in the knowledge of these important accessory food factors namely the vitamins. Exhibition in proper dosage of A vitamin checks to some extent proneness to infection, either of the gastro-intestinal, respiratory or the cutaneous systems, which in its prolonged want, shows a tendency to chronicity. It should be explicitly stated however again, that A vitamin in particular is not a panacea for all ills consequent on its deprivation.

VITAMIN B

Frank aritiaminosis of B.

Vitamin B has got two definite components B₁ or F and B₂ or G besides other vaguely or indefinitely determined ones. The lack of B₁ leads to beri beri group of symptoms. So also B₁ or G or p p factor, the so called pellagra preventive component is too well-known. Generally there are two types of beri beri one differing materially from the other, one is the dry polyneuritic type, the brunt of the trouble falling on the nerves, whereas in the other form the cardiovascular system suffers most with oedema etc. The etiology of pellagra was more or less clearly established by the pains-taking researches of Gold Berger¹⁰ (1918). Since then numerous workers¹¹ have worked in the line and it is now considered that lack of B₁ factor in diet is not the sole cause but probably there coexist other factors like lack of suitable animal protein in diet and so on. In short the symptoms are digestive, nervous with psychic disturbances, and associated symmetrical erythema or pigmentation. Loss of epithelium of the tongue with diarrhea, and sprue, may be traced to lack of this vitamin B complex. Liver extract is useful for them.

Incipient aritiaminosis of B.

"It is also believed by many that a nervous element due to the lack of vitamin B₁, is a strong predisposing factor to the etiology of the ulcers of the gastro-intestinal tract either gastric or duodenal."

10. Goldberger and others, (1918), Jour. Amer. Med. Assoc. 71: p 911-910.

11. Sure, (1932) Ibid. 99, p.

"McCollum is of the opinion that there are hundreds of thousands of border line cases of functional nervous maladies that occur because of a deficiency of vitamin B₁ in the diet of the average American. For the perfect nutrition of the nervous system, whole wheat bread, green vegetables, and fresh fruits, all of which are important sources of vitamin B₁, should be more largely used."

"Experiments upon rats suggest that if the milk of infants' diet be not supplemented by other sources of vitamin B₁ during the early months of life, there is danger of failure of development of the mental powers."¹² From its want in diet constipation also commonly results

If the above view holds good in America, where the economic, dietetic and educational standards are so high, what need we really do with ignorance of our people in the midst of extreme poverty?

VITAMIN C

Frank ascorbinosis of C

When there is lack of this vitamin in diet for sometime the endothelium of the blood vessels¹³, specially those of the fine capillaries, suffers greatly leading to a tendency to easy haemorrhage. The odontoblasts that fill the tooth may also be injured resulting in a predisposition to caries and oral sepsis. The bone cells are rarefied too, and this is confirmed by skiagrams.

Incipient ascorbinosis of C

Recently Harris and Ray¹⁴ reported on the diagnosis of vitamin C subnutrition by urine analysis, with a note on the antiscorbutic value of human milk. They come to the following conclusion. Infants suffering from manifest scurvy or those with a history of C vitamin deficiency excrete less of C vitamin in their urine, as measured chemically than do well nourished infants with adequacy of this in their diet, who served as controls.

Further observations on adults are reported, showing that a low urinary output and a low response to test doses, go parallel with C vitamin deficiency in diet and with a state of C vitamin sub-nutrition as indicated by the test of capillary resistance.

Recent knowledge particularly on C vitamins has added much to our methods and weapons of treatment of various diseases, such as purpura haemorrhages, constipation, proneness to trivial infections etc.

VITAMIN D

Frank ascorbinosis of D

Rickets is described in its proper place

But it is now generally believed that dental caries may be due

¹² Barker, (1934) Treatment of commoner diseases p 272, Lappingot

largely to deficiency of calcium, phosphorus and vitamin D in the ingested diet.¹⁵ It is also suggested that if the calcium and phosphorus content of the blood is kept high, dental caries are less frequent. Pregnant and nursing women should take plenty of D vitamin in their diet. Children and young adults who live in the temperate zone and do not get much sunlight should regularly take D vitamin during the winter months.

Incipient avitaminosis of D

Rickets children, and those having calcium and phosphorus in balance in blood are specially susceptible to ordinary respiratory diseases to which a normal child would hardly fall a victim. There are again many children, young boys and girls who show constant running from the nose with a tendency to chronic catarrh. Some of these cases respond well to prolonged treatment by adequate doses of A and D vitamins. Such treatment continued over a long period tends to diminish the susceptibility to all sorts of trivial infections.

VITAMIN E

Avitaminosis of E

Lack of vitamin E in diet tends to produce sterility.

Protective food

Besides the above there are three articles of diet which are of unusual supplemental nutritive value and they are milk and its preparations,¹⁶ leafy green vegetables and eggs. According to many workers they are protective foods. It is really due to the abundance of fresh vegetables, specially the leafy ones in diet, which are protecting our poorer village population, from profound malnutrition. If a little milk, an egg is added to it, most of the need excepting that for adequate protein is satisfied.

According to McCollum, one must take first what is essential for his health and active life and then he should take things to his liking. *'Eat what you want after you have eaten what you should.'*

According to Lucy Gillett¹⁷ (1933) the following distribution of the purchase money spent for ration should be prudent:

(1) Fruits and vegetables	one fifth
(2) Milk and Cheese	one fifth or more
(3) Meat, fish and eggs	one fifth or less
(4) Bread and cereals	one fifth or more
(5) One fifth or less for sugars, fat and other groceries	

13 Geddes (1933) Jour Lab and Clin Med 18 p 494-490

14 Harris and Roy (1935) J Inect Jan 12 p 71

15 Wallace (1932) Pub Health 46 p 81-88

16 McCarrison (1936) Brit Med Jour II p 611

17 Gillett (1933) Jour Amer Diet Assoc 8 p 382-387